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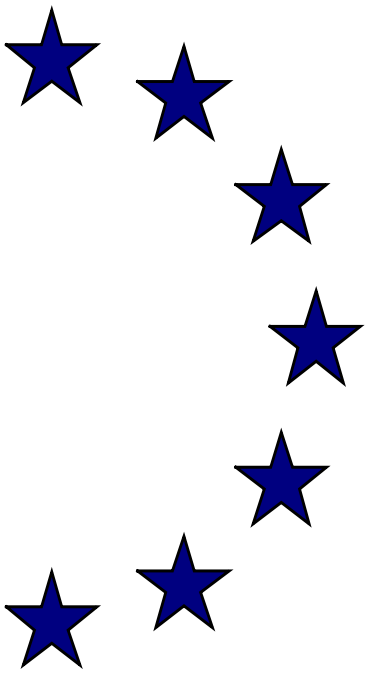

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External assumptions, the international environment and the track record of the Commission Forecasts

by

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Abstract

While in the Commission Forecasts interest rates, exchange rates or oil prices are treated more like assumptions, it is interesting to test their realism. It appears that these variables are formulated in a reasonably accurate way and that in general alternative assumptions would not improve the picture. More specifically, the Commission approach to fixing the exchange rate outperforms a procedure based on the use of forward exchange rates or central parities. This implies that it would be reasonable to continue with the current approach and include the Candidate Countries eventually. Somewhat more attention could, however, be paid to oil futures when setting the oil price. With respect to the direction of bias, there is a tendency to set favourable assumptions, but this is in general not significant in a statistical sense. In the case of one-year predictions, the external assumptions together with the international economic environment outside the EU can explain on average up to about 60 % of the forecast error in EU GDP and inflation. It is larger in the case of the 2001 overestimation of EU GDP growth and the 1998 overestimation of EU inflation. In particular an accurate assessment of world GDP and trade is important. Wrong oil prices affect the quality of the inflation forecast. The monetary assumptions play a lesser role, but the signal coming from long-term interest rates influences the GDP forecast and the exchange rate assumptions have an impact on the import price errors.

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I. Introduction

Twice a year (in spring and autumn), the European Commission (EC) produces short-term macroeconomic projections which concentrate on the Member States of the European Union (EU). The forecasts are not based on a centralised econometric model. Instead, they result from the analysis made by country desks, each of which use statistical methods to varying degrees, but the forecasts are checked for mutual consistency. The EU or euro area variables are not directly forecast, but obtained by aggregation. In terms of time horizon, the focus is on the current year and the next and the forecasts are based on annual data. More information on forecasting at the European Commission can be found in Keereman (1999) which contains also an assessment of the ex-post accuracy of the Commission predictions. Artis & Marcellino (2001) examined the track record of fiscal projections of the IMF, OECD and European Commission.

The focus of these studies was the analysis of the forecast quality of the main macroeconomic variables like GDP, inflation, investment, unemployment, government balances and the current account. The present analysis concentrates on the external environment, shaped by external assumptions together with world GDP and international trade. With respect to the external assumptions, the focus is on the exchange rates, short- and long-term interest rates and oil prices. Concerning world GDP, in particular the role of US GDP growth is examined and the international trade dimension is represented by world imports, import prices and export volumes.

The external assumptions, unlike world GDP or international trade, are not truly predicted in the Commission approach to forecasting, but fixed according to a certain rule. The motivation for doing so is twofold.

First, these financial variables are very volatile and in consequence difficult to predict in the one to two year time horizon on which the Commission forecast focuses. Sophisticated forecasting techniques do not appear to outperform simple rules for the fixing of asset and commodity prices.

Second, at certain moments these variables can be heavily influenced by policy decisions of public authorities, e.g. by the ECB on short-term interest rates, the OPEC on oil prices or governments can adjust exchange rate parities. In this context a "forecast" by an international public institution like the Commission may be interpreted as pre-empting a policy decision, while it could have been the purpose of national authorities to avoid a particular event (e.g. a devaluation). Furthermore, a "forecast" could be seen as normative or prescriptive which could conflict with the principle of subsidiarity or is could be felt as interference with the independence of other policy actors. As a result, interest rate assumptions are not published.

Given the way the external assumptions are formulated, the macroeconomic forecasts of the Commission have to be considered as conditional on these hypotheses. Although the correctness of the external assumptions is not the main purpose of the Commission forecasting exercise, it is of interest to analyse their role and the role of the international economic environment. More in particular, this paper has four goals: (i) to check the realism of the external hypotheses and to have an idea of the order of magnitude of the error one is likely to make; (ii) to analyse whether there exist easy alternatives to the present procedure of fixing the assumptions; (iii) the past experience of the Commission in setting assumptions for exchange and interest rates for Member States under various exchange rate regimes is of interest for the Candidate Countries which are characterised by various currency arrangements; (iv) finally, an attempt is made to calculate what share of the forecast error in two key variables, namely EU inflation and GDP growth, can be attributed to the external assumptions and a wrong assessment of the international economic environment.

II. Overview of the structure of this paper

In section III and IV are described how in the Commission Forecasts the external assumptions (interest rates, exchange rates and oil prices) are formulated and the international economic environment (world trade and GDP) is assessed.

The variables used are described in section V, as well as the basic characteristics of the sample data.

Essential information on the size of the mistakes is obtained from the mean error, the mean absolute error and the root mean square error, presented in section VI. This section contains also an assessment of the quality of the external assumptions relative to alternative hypotheses.

The persistence of errors and the existence of a possible bias is examined in section VII and VIII. Their observation would imply that the formulation of the external assumptions could be improved by exploiting better the information in the series.

The efficiency of the formulation of the external assumptions is analysed in section IX. By this is meant, the appropriateness of setting an assumption for a particular year given the information contained in the series.

The extent to which the accuracy of the external assumptions changed over time is analysed in section X together with the relation to the underlying volatility of the data.

The question of the extent to which the direction of change is correctly indicated by the assumptions is the subject of section XI.

In sections V to XI, the focus is on the quality of the external assumptions in the Commission Forecasts. The results are presented in tables which systematically contain 2 blocks. The first part presents the error statistics relating to the key assumptions: short and long interest rates for Germany (later the euro area in the case of short-term interest rates), the EU aggregate and the US, the US dollar exchange rate (against the German mark, later the euro) and oil prices. The second part of the tables presents the interest and exchange rate assumptions of the Member States which at some time participated in an exchange rate arrangement.

The main characteristics of the prediction mistakes in the international economic environment (US GDP, world trade, import prices and export volumes) are only briefly recalled in section XII, as a comprehensive analysis was made in Keereman (1999).

Before analysing the impact of a wrong external environment assumption on the quality of the EU GDP and inflation forecasts in section XIV, the main characteristics of these two variables is presented in section XIII, which is short for similar reasons as those mentioned in relation to the international economic environment. The determinants of some big forecast errors are examined in section XV.

The main conclusions can be found in section XVI.

III. The formulation of the external hypotheses

The major external assumptions concern short- and long-term interest rates, exchange rates and oil prices. As far as exchange rates are concerned, from 1999 onwards the US dollar/euro forms the pivot of the system; before this, the US dollar was set against the German mark. The second

layer consists of fixing the other exchange rates, where the European currencies belonging or not to an exchange rate arrangement deserves particular attention because of potential political implications. Several commodity prices are set, including food, minerals and metals, wood and pulp and fuel products (see e.g. European Commission, 2002, table 61). The present analysis concentrates on crude petroleum.

Short- and long-term interest rate assumptions are not published for the reasons explained above. Exchange rates and commodity prices are released (see e.g. European Commission, 2002, table 29 and 61). During a forecasting exercise which lasts about 2 months, assumptions can be adapted to take account of the latest developments.

More precisely the external assumptions are formulated as follows (see e.g. European Commission, 2002, box 2.1):

Interest rates

Short-term interest rates are set in order to reflect the objective of monetary policy with respect to price stability. Long-term interest rate assumptions are based on developments in short-term rates and an assessment of economic conditions. Attention is paid to international financial linkages, market expectations and budgetary developments.

Exchange rates

Constant real rates (nominal rates adjusted for changes in GDP deflators) are assumed for the USD/EUR exchange rate. This means that that a purchasing power parity rule is followed. It implies that the expected exchange rate change is set equal to the inflation differential; e.g. the USD will depreciate against the EUR by the excess of US inflation over inflation in the euro area. The other currencies not forming part of an exchange rate arrangement are fixed in a similar way. Only the currencies used in the Commission calculation of effective exchange rates are considered. These are, besides the US dollar and the euro, the other Member States currencies (Swedish krone and pound sterling) and the currencies of the main trading partners (Japanese yen, Swiss franc, Norwegian krone, Canadian dollar, Australian dollar, Mexican peso and New Zealand dollar).

Constant nominal exchange rate are assumed for currencies belonging to the European Exchange Rate Mechanism (ERM). When the Greek drachma joined the ERM on 15 March 1998, this has also been the case for the other Member States except Swedish krone and pound sterling until the irrevocably fixing of the exchange rates among euro area participants on 1 January 1999. At that moment, the multilateral parity grid with bilateral fluctuation margins of ± 15 % against every currency in the grid was replaced by a system (ERMII) with a standard fluctuation margin of ± 15 % vis-à-vis the central parity (the euro). The Danish krone is the only ERMII currency since 1 January 2001, when Greece became a member of the euro area.

It has to be stressed that the formulation of the exchange rate assumptions has never changed, despite the numerous modifications of the currency arrangements in the eighties and nineties. Members States devalued or revalued their currencies or opted in and out the ERM. Annex A gives an overview of the exchange rate arrangements in the Member States since the start of the ERM in 1979 which corresponds also to the period covered by this study.

In order to avoid giving too much weight to extreme values, the starting value for the stability assumption is the average exchange rate calculated over several weeks preceding the finalisation of the forecasts.

The experience with the Commission approach in this area could be of interest for the formulation of the exchange rate assumptions of the Candidate Countries which are

characterised by different currency arrangements (see Annex A). The Commission (European Commission, 1996) started to publish comprehensive macroeconomic forecasts for these countries in Autumn 1996 and the formulation of their exchange rate assumptions has not followed the same clear and rigorous rules as for the Member States. Given the catching up nature of these countries, the purchasing power parity rule was not strictly adhered to for some of the floating currencies and a real appreciation was assumed.

Oil prices

Oil prices are set taking into account market conditions. Both demand, as influenced by growth prospects, and supply, as partly determined by the behaviour of the OPEC cartel, shape the oil price assumptions. Attention is also paid to the development of future prices, in particular for the assumptions concerning the current year.

IV. The forecast of the international economic environment

Contrary to the monetary and oil price assumptions, forecasts are made for US GDP, world imports, EU export volumes and EU import prices in the sense that there is an explicit attempt to predict the true value coherent with available information including external assumptions. It is a judgmental approach to forecasting meaning that econometric modelling does not play a prominent role in deriving the predictions. It is also a bottom-up approach to forecasting as world or EU aggregates are derived as the weighted sum of country desk projections.

At the world level, export and import prices and volumes should be equal. To that end a trade consistency model was developed (Jones (1983), Kieler,(1995)) in which export prices and import volumes are exogenous variables given by country desks. Taking into account the trade relations which exist between countries, adding up constraints and the external assumptions, it is then possible in an iterative process to derive import prices and export volumes. The outcome of the trade consistency exercise guides the country desks, which are, however, free to deviate from the model results as there may be special factors which are difficult to capture in equations.

V. Variables and data

1. Variables

Short-term interest rates

Short-term interest rates are based on the 3-months money market rates observed in each country under analysis. From 1999, with the irrevocably fixing the exchange rates among 11 Member States, short-term interest rates are the same among the euro area participants. In 2001, Greece joined this group of countries.

Long-term interest rates

References for long-term interest rates differ in time and among countries. While prior to 1995, they are based on available long-term domestic interest rates (implying different maturities), after 1995 they refer to the 10-year bench mark yield. During Greece's disinflation process in the beginning of the nineties long-term interest rates were not available.

Exchange rates

At the centre of the formulation of the exchange rate assumptions is the US dollar. Before the introduction of the single currency in 1999, the European reference currency was the German mark and the focus was on the DEM/USD exchange rate. From 1999, the euro replaced the German mark and the focus is on USD/EUR exchange rate. For analytical reasons it is useful to dispose of long time series and the DEM/USD exchange rate series has been prolonged with observations for the USD/EUR exchange rate. To make sense the merged series has been expressed in percentage changes. The change in the euro in 1999 has been calculated against the value of the ECU in 1998[1]. The series is constructed in such a way that a positive entry means an appreciation of the European currency (DEM before 1999, EUR afterwards).

Among European currencies, the assumptions were formulated against the DEM and, when the euro was introduced, against that currency. This means that for non-euro participants the exchange rate series is prolonged with observations of the national currency against the euro (for the Greek drachma until 2000). In order to bridge the level gap from national currencies expressed in DEM to EUR, the linked series is expressed in percentage changes. In analogy with the USD exchange rate series, a positive entry is an appreciation of the European reference currency (DEM before 1999, EUR afterwards).

Oil price

The oil price values simply refer to the USD price per barrel of crude Brent petroleum.

Trade

The trade variables, both volumes and prices, refer to goods only.

Number of observations

The time period covered by the series varies from one variable to another and depends also on the country. While the oil price series covers the years 1975-2001, the exchange rate series consider the period 1979-2001. Short-term and long-term interest rates start in 1983.

Since the focus of the Commission forecasts has been on the Member States, the time series with forecasts/outturns is much longer for the original countries than for those joining later (with series for Spain and Portugal starting in 1986 only). Austria, Finland and Sweden, which joined the EU in 1995, are not included in the study as not enough data are available to derive meaningful conclusions on the forecast accuracy for these countries. US long-term interest rate forecasts are available only from 1993.

2. Aggregation and interpretation of the break in series due to the euro

In the case of short and long-term interest rates, an EU aggregate is presented. It is a weighted average (based on GDP weights) of the member countries at a given point in time. It implies that the number of countries represented in the aggregate increases from 10 in 1983 to 12 in 1986 when Portugal and Spain joined the EU and to 15 in 1995 when Austria, Finland and Sweden joined.

When a country joined the euro area, its short-term interest rate series is discontinued. The German interest rate series is, however, prolonged and represents from 1999 the euro area short-

[1] An alternative method could have been to retropolate the value of the euro.

term interest rate. In the case of long-term interest rates, small differentials continue to exist among euro area participants and all Member States' are updated until 2001.

The introduction of the euro led to the discontinuation of some series and a break in others. The prolonged series give information on how well, e.g. the key US dollar exchange rate is fixed on average, bearing in mind that first this occurred against the German mark and later against the euro. The information content is similar to error statistics related to the EU aggregate whose composition also changed over time. Is it also the best guess for the error one is likely to make now in setting the USD/EUR exchange rate ? What are the alternatives ? First, error statistics based on data since 1999 when the euro was introduced do not appear reliable because the sample is too short. Second, the ECU exchange rate could be used before 1999, but the inclusion of the pound sterling which did not adopt the euro makes the ECU exchange rate an unsuitable candidate. Furthermore, there was no single monetary authority monitoring the ECU interest rate and exchange rate.

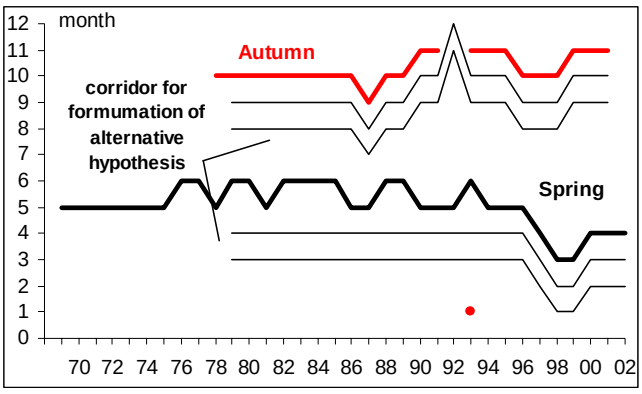
Retropolating the EUR exchange rate and short-term interest rate with DEM values is probably the best and easiest available option to calculate error statistics concerning the euro area. The ECB was created in the image of the Bundesbank and the closest resemblance to the conduct of the single monetary policy is probably offered by German monetary policy.

3. Time dimension and the selection of assumption and outturn data

In order to examine the sensitivity of the formulation of the external assumptions with respect to the time horizon, two types of forecasts and their associated outturns are analysed:

i) the *current year* assumptions are concerned with the quality of the projection made in the beginning of the year for the same year;
ii) the *year ahead* assumptions deal with the following year.

Figure 1: Finalisation dates of the forecasts



The current year assumptions are represented by data selected from forecasts finalised in Spring, typically in May, but recently there has been a tendency to finish earlier (see figure 1).

The year ahead assumptions are taken from the Autumn forecasts. These may consist of September projections of the year before, or from the January projections of the year to be forecast as was the case in 1993 (see figure 1). The Autumn 92 Forecasts were delayed by exchange rate turmoil which eventually led to the suspension of the ERM participation of the pound sterling as from 17 September 1992 and the temporary non-application of the intervention limits for the Italian lire until 25 November 1996.

Unlike national accounts, financial variables and oil prices are not subject to revision and the selection of the outturn data set may influence the assessment of the forecast accuracy (Keereman, 1999). The realised numbers against which the assumptions are checked are taken from the Spring Forecasts following on the year for which the assumptions are formulated.

Table 1: Basic characteristics of the sample data – current year

Key assumptions

	Short interest rates			Long interest rates			USD[2] against DEM, EUR after 1999	Brent crude
	D[1]	EU	US	D	EU	US		USD/barrel
Sample	83/01	83/01	83/01	83/01	83/01	93/01	79/01	75/01
No of obs.	19	19	19	19	19	9	23	27
MV(R)	5.4	7.9	6.1	6.5	8.4	6.1	-0.13	20.9
STD(R)	2.0	2.8	1.8	1.3	2.3	0.7	12.40	7.0

Other assumptions

Short-term interest rates, % p.a. (BEF = LUF)

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
Sample	83/98	83/01	83/00	86/98	83/98	83/98	83/98	83/98	83/98	86/98	83/01
No of obs.	16	19	18	13	16	16	16	16	16	13	19
MV(R)	7.5	7.9	17.3	11.0	8.1	9.7	11.7	7.5	5.9	12.0	8.7
STD(R)	2.7	3.1	4.8	3.8	2.7	3.1	3.5	2.7	1.9	4.2	3.0

Long-term interest rates, % p.a

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
Sample	83/01	83/01	83/01	86/01	83/01	83/01	83/01	83/01	83/01	86/01	83/01
No of obs.	19	19	15	16	19	19	19	19	19	16	19
MV(R)	7.9	9.1	15.4	9.7	8.2	8.8	10.7	7.8	6.9	11.4	8.5
STD(R)	2.2	2.9	6.7	3.4	2.8	3.0	3.7	2.2	1.5	4.8	2.1

Exchange rates[2], annual % change against DEM, EUR after 1999 (BEF = LUF)

	BEF	DKK	GRD	ESP	FRF	IEP	ITL	LUF	NLG	PTE	GBP
Sample	79/98	79/01	81/00	86/98	79/98	79/98	79/98	79/98	79/98	86/98	79/01
No of obs.	20	23	20	13	20	20	20	20	20	13	23
MV(R)	1.40	1.29	11.18	2.47	2.01	2.24	4.36	1.40	0.15	3.45	1.23
STD(R)	3.61	2.72	9.36	6.14	3.93	4.67	6.53	3.61	0.53	5.16	8.19

[1] D = euro area from 1999
[2] + = appreciation of DEM or EUR
MV(R): realised average
STD(R): standard deviation of realisation data

4. Basic characteristics of the sample data

In tables 1 and 2 the basic characteristics of the sample data are presented. They will facilitate the interpretation of the results. The tables have two blocks: "key assumptions" regroups the data concerning interest and exchange rates for the EU and the US as well as oil prices; in "other assumptions" the details for the Member States are given. With respect to external assumptions, this presentation in two blocks is maintained throughout the paper.

The mean value (MV) gives an idea about the order of magnitude of a variable. The more volatile a variable, the more difficult to forecast in general and fix the external assumption. A measure of this is the standard deviation (STD). However, variables can move in large swings producing a high value for the standard deviation, but to the extent that the swing is regular, the increased difficulty to predict is questionable.

As far as the key assumptions are concerned, one notes that the average German short-term interest rate is the lowest, but that its standard deviation is larger than the one of US short-term rates, making the formulation of external assumptions for the latter in principle easier. The standard deviation of US long rates is even lower, but the sample period is different. Comparing beginning and end of the sample, the US dollar hardly moved against the German mark. The average annual appreciation of the USD against the DEM (EUR from 1999) was 0.13 % resulting in an appreciation of 3 % between 1979 and 2001 (see also figure 6). However, its volatility was high as measured by the standard deviation. The average oil price was USD 20.9 per barrel over the sample period and varied considerably (the standard deviation is USD 7).

Table 2: Basic characteristics of the sample data –year ahead

Key assumptions

	Short interest rates			Long interest rates			USD[2] against DEM, EUR after 1999	Brent crude
	D[1]	EU	US	D	EU	US		USD/barrel
Sample	84/01	84/01	84/01	84/01	84/01	93/01	80/01	75/01
No of obs.	18	18	18	18	16	9	22	27
MV(R)	5.4	7.8	6.0	6.4	8.2	6.1	-0.13	20.9
STD(R)	2.1	2.7	1.7	1.3	2.2	0.7	12.40	7.0

Other assumptions

Short-term interest rates, % p.a. (BEF = LUF)

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
Sample	84/98	84/01	84/00	87/98	84/98	84/98	84/98	84/98	84/98	87/98	84/01
No of obs.	15	18	17	12	15	15	15	15	15	12	18
MV(R)	7.3	7.7	17.6	10.9	7.8	9.4	11.3	7.3	5.9	11.7	8.7
STD(R)	2.6	3.0	4.8	3.9	2.6	3.0	3.2	2.6	2.0	4.2	3.1

Long-term interest rates, % p.a

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
Sample	84/01	84/01	84/01	87/01	84/01	84/01	84/01	84/01	84/01	87/01	84/01
No of obs.	18	18	14	15	18	18	18	18	18	15	18
MV(R)	7.7	8.8	15.1	9.6	7.9	8.6	10.3	7.6	6.8	10.9	8.3
STD(R)	2.0	2.7	6.7	3.5	2.5	2.8	3.4	2.1	1.4	4.6	2.0

Exchange rates[2], annual % change against DEM, EUR after 1999 (BEF = LUF)

	BEF	DKK	GRD	ESP	FRF	IEP	ITL	LUF	NLG	PTE	GBP
Sample	80/99	80/01	82/00	87/99	80/99	80/99	80/99	80/99	80/99	87/99	80/01
No of obs.	20	22	19	13	20	20	20	20	20	13	22
MV(R)	1.33	1.29	11.62	2.29	1.9	2.17	4.16	1.33	0.14	2.33	1.23
STD(R)	3.53	2.72	9.44	5.91	3.8	4.55	6.42	3.53	0.51	4.11	8.19

[1] D = euro area from 1999
[2] + = appreciation of DEM or EUR
MV(R): realised average
STD(R): standard deviation of realisation data

For currencies which have belonged or still belong to exchange rate arrangements, interest rates were higher on average and their volatility was larger than DEM short or long rates. In exchange apparently exchange rate stability could be bought as suggested by the lower standard deviation compared to USD exchange rate. The pound sterling displayed the largest volatility and formed only briefly part of the exchange rate mechanism.

For the analysis of the year ahead assumptions one observation is lost in the beginning of the sample, but this has a negligible impact on the descriptive statistics (see table 2).

VI. Basic characteristics of the errors

1. Mean error and mean absolute error

The difference between the average forecast and the average outturn is the mean error (ME). It can be interpreted only as a first impression of the quality of the assumption as positive and negative errors can offset each other and thus reduce the size of the error. As the mean error is defined as the assumption minus the outturn, a negative sign indicates underestimation, a positive sign overestimation. The mean absolute error (MAE) avoids the possibility under the ME of giving a flattering picture of forecast accuracy when the mean error is reduced by offsetting positive and negative mistakes. Of the two, the MAE is the preferred error statistic. Mean error and mean absolute error can be compared to the mean absolute value (MAV) to put the size of the mistakes into perspective. The mean absolute value is equal to the mean value (MV) unless the underlying series has negative entries (compare tables 3 and 4 with 1 and 2).

This is only the case for exchange rates where a depreciation of the USD is entered with a negative sign.

Table 3: Basic characteristics of the forecast errors – current year

Key assumptions

	Short interest rates			Long interest rates			USD[2] against DEM, EUR after 1999	Brent crude
	D[1]	EU	US	D	EU	US		USD/barrel
MAV	5.4	7.9	6.1	6.5	8.4	6.1	8.94	20.9
ME	-0.2	-0.3	-0.2	0.0	0.0	0.1	1.11	-0.8
MAE	0.4	0.4	0.5	0.3	0.4	0.5	3.78	1.7
RMSE	0.5	0.5	0.9	0.4	0.6	0.5	4.70	2.3
THEIL1	0.39	0.46	0.65	0.50	0.60	0.83	0.39	0.44
THEIL2	0.24	0.20	0.53	0.33	0.25	0.78	0.39	0.34
THEIL3							0.23	1.02

Other assumptions

Short-term interest rates, % p.a. (BEF = LUF)

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
MAV	7.5	7.9	17.3	11.0	8.1	9.4	11.3	7.5	5.9	12.0	8.7
ME	0.1	-0.1	-1.1	-0.6	-0.3	-0.3	-0.4	0.1	-0.2	-0.4	-0.2
MAE	0.5	0.8	1.8	0.7	0.5	1.1	0.7	0.5	0.5	0.9	0.6
RMSE	0.7	1.1	2.5	0.9	0.6	1.4	1.0	0.7	0.5	1.2	1.0
THEIL1	0.44	0.70	0.66	0.35	0.35	0.57	0.44	0.44	0.40	0.52	0.54
THEIL2	0.18	0.37	0.41	0.16	0.14	0.30	0.18	0.18	0.19	0.19	0.34

Long-term interest rates, % p.a

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
MAV	7.9	9.1	15.4	9.7	8.2	8.8	10.8	7.8	6.9	11.4	8.5
ME	0.0	-0.2	-0.6	-0.1	-0.2	0.0	0.1	0.0	-0.2	0.2	0.0
MAE	0.4	0.5	2.3	0.7	0.5	0.6	0.7	0.4	0.4	0.8	0.4
RMSE	0.5	0.7	3.1	1.0	0.7	0.7	1.0	0.5	0.6	1.5	0.5
THEIL1	0.47	0.69	1.39	0.62	0.56	0.69	0.70	0.46	0.61	0.91	0.62
THEIL2	0.23	0.25	0.47	0.29	0.26	0.25	0.29	0.22	0.38	0.33	0.25

Exchange rates[2], annual % change against DEM, EUR after 1999 (BEF = LUF)

	BEF	DKK	GRD	ESP	FRF	IEP	ITL	LUF	NLG	PTE	GBP
MAV	1.84	1.99	11.18	5.03	2.65	3.55	5.61	1.84	0.41	5.45	6.16
ME	0.02	0.20	0.05	0.66	0.14	-0.08	0.06	0.02	0.09	0.95	0.40
MAE	0.51	0.78	1.94	1.90	0.59	1.22	1.54	0.51	0.24	0.80	3.16
RMSE	0.72	1.17	2.24	2.38	0.73	1.66	2.15	0.72	0.49	1.29	3.89
THEIL1	0.19	0.13	0.16	0.34	0.17	0.33	0.28	0.19	0.75	0.17	0.49
THEIL2	0.21	0.16	0.25	0.39	0.20	0.38	0.34	0.21	0.79	0.21	0.06
THEIL3	0.82	0.54		0.82	0.64		0.57		1.43		0.25
THEIL4	0.67	0.67		0.83	0.35	0.19	0.65	0.67	1.03	0.63	

[1] D = euro area from 1999
[2] + = appreciation of DEM or EUR
MAV, ME, MAE, RMSE, THEIL1 to 4, see text

The key short-term interest rates are slightly underestimated, both in the current year and year ahead, except in the case of US short rates which are overestimated for the year ahead. At the EU level, the mean absolute error for short-term rate assumptions is 0.4 % and for the US it is 0.5 %, which both double in the year ahead. The mean absolute error for the short-term rate which is at the centre of the fixing of monetary conditions in the EU (first the DEM, then the EUR) remained, however, limited to 0.6 % in the year ahead. The mean absolute errors for long rates are smaller than for short rates. The European currencies are seen appreciating vis-à-vis the USD on average slightly more than 1 % than what actually happened. Figures 6, 7 and 9 suggest that the underestimation of the USD was mainly a phenomenon of the early eighties and of the end of nineties when the euro was introduced. On this account there is not much difference between the current year and year ahead, but the absolute error more than doubles from 3.78 % to 7.70 %. Though small, compared to its average level, the error in forecasting oil prices exceeds 1 USD/barrel in the current year (1.7 USD/barrel) and more than doubles in the year ahead (3.5 USD/barrel).

Table 4: Basic characteristics of the forecast errors –year ahead

Key assumptions

	Short interest rates			Long interest rates			USD[2] against DEM, EUR after 1999	Brent crude
	D[1]	EU	US	D	EU	US		USD/barrel
MAV	5.4	7.8	6.0	6.4	8.2	6.1	8.90	20.9
ME	-0.2	-0.3	0.6	0.1	0.1	0.4	1.25	0.5
MAE	0.6	0.8	1.0	0.6	0.8	0.8	7.70	3.5
RMSE	0.9	0.9	1.4	0.8	0.9	1.0	9.81	4.7
THEIL1	0.70	0.75	0.91	0.93	0.95	1.27	0.85	0.87
THEIL2	0.45	0.35	0.82	0.64	0.43	1.39	0.81	0.68
THEIL3							0.70	0.94

Other assumptions

Short-term interest rates, % p.a. (BEF = LUF)

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
MAV	7.3	7.7	16.6	10.9	7.8	8.7	10.8	7.3	5.9	11.7	8.7
ME	-0.1	0.0	-2.2	-0.7	-0.3	-0.7	-0.5	-0.1	-0.3	-0.6	-0.2
MAE	0.8	1.2	2.6	1.6	0.9	1.2	1.1	0.8	0.7	1.1	1.0
RMSE	1.0	1.4	3.5	2.3	1.1	1.7	1.5	1.0	0.9	1.4	1.4
THEIL1	0.60	0.89	0.92	0.87	0.60	0.64	0.65	0.60	0.55	0.59	0.65
THEIL2	0.27	0.49	0.57	0.38	0.28	0.36	0.27	0.27	0.30	0.23	0.46

Long-term interest rates, % p.a

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
MAV	7.7	8.8	15.1	9.6	7.9	8.7	10.4	7.6	6.8	10.9	8.3
ME	0.1	0.0	-0.6	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.1
MAE	0.7	0.9	2.0	1.3	0.9	0.9	0.8	0.7	0.5	1.0	0.6
RMSE	0.8	1.1	2.6	1.6	1.1	1.1	1.1	0.8	0.7	1.2	0.8
THEIL1	0.70	0.95	0.99	1.07	0.82	1.06	0.74	0.76	0.83	0.72	0.99
THEIL2	0.40	0.42	0.40	0.48	0.44	0.41	0.33	0.42	0.50	0.26	0.40

Exchange rates[2], annual % change against DEM, EUR after 1999 (BEF = LUF)

	BEF	DKK	GRD	ESP	FRF	IEP	ITL	LUF	NLG	PTE	GBP
MAV	1.73	1.86	11.54	4.17	2.48	1.87	3.45	1.73	0.32	4.06	6.41
ME	-0.28	-0.18	-2.55	-0.65	-0.27	-0.70	-1.01	-0.28	0.01	0.26	0.74
MAE	1.07	1.47	3.86	2.51	1.28	2.84	3.65	1.07	0.42	1.99	5.15
RMSE	2.37	2.18	5.45	3.39	2.04	3.66	4.97	2.37	0.74	3.08	6.93
THEIL1	0.64	0.33	0.38	0.55	0.49	0.74	0.68	0.65	0.88	0.53	0.90
THEIL2	0.69	0.30	0.58	0.71	0.54	0.82	0.79	0.69	1.47	0.74	0.11
THEIL3	0.78	0.27		0.84	0.76		0.90		0.87		0.69
THEIL4	0.59	0.29		0.76	0.53	0.55	0.63	0.59	1.65	1.16	

[1] D = euro area from 1999
[2] + = appreciation of DEM or EUR
MAV, ME, MAE, RMSE, THEIL1 to 4, see text

There is a tendency to underestimate interest rates in Member States, but this disappears with the long-term interest rates set for the year ahead. The mistake, measured with the MAE in fixing current year short-term interest rate assumptions ranges from 50 basis points for Belgium (and Luxembourg), France and the Netherlands to 180 basis points for Greece. These numbers increase by about 50 % in the case of the year ahead assumptions. The mistake with long rates is somewhat smaller, except for Greek long rates set as an assumption for the current year. The mean error in setting the currencies of the Member States against the DEM in the past and since 1999 against the EUR is small. Also the mean absolute error is small, but nevertheless appears large compared to the mean absolute value (compare MAE with MAV in tables 3 and 4). In the current year, the absolute exchange rate change is missed by 0.24 % for the NLG/DEM exchange rate going to 3.16 % for the GBP/DEM(EUR) exchange rate. There is about a doubling in the year ahead.

2. Root mean square error

The root mean square error (RMSE) is used to penalise large mistakes. The difference between the values for the mean absolute error and the root mean square error suggests that in some

cases large errors are registered in certain years. This applies notably to short-term US interest rates, the USD exchange rate and oil prices.

There seems also to be a concentration of large errors with Greek and UK short-term interest rates. By contrast the error distribution in setting long-term interest rates appears more even. Finally, the error in setting the exchange rate assumption for the Member States (often in the ERM) seems also to have been large in some years. This was the case for the Belgian (Luxembourg) frank, Dutch guilder and some extent also the Portuguese escudo when setting assumptions for the year ahead. The relatively large mistake in fixing the value of the pound sterling is more evenly distributed over the years.

3. Errors of naïve alternative assumptions

The value of a forecast should not only be appreciated in terms of its own errors. It should also be compared to naïve or easily available alternatives (Theil, 1966). In the case of interest rates, the two alternatives examined are the 'no change' assumption and the trend forecast. The trend is calculated as the sample average. In the case of exchange rates also forward exchange rates and, in addition, for the currencies which have participated in an exchange rate arrangement, the central parity are examined as alternatives. Future prices are considered for oil prices.

The THEIL1 statistic is the ratio of the RMSE of the Commission assumption to the RMSE of the 'no change' assumption. The THEIL2 statistic refers to the ratio between the RMSE of the Commission assumption to the RMSE of the trend assumption. The THEIL3 statistic is the ratio of the RMSE of the Commission assumption to the RMSE of an assumption based on forward exchange rates or future oil prices. The THEIL4 statistic is the ratio of the RMSE made with the Commission assumptions related to the RMSE from using the central parity as the exchange rate assumption. Annex B gives more detailed information on how the alternative hypotheses based on forward exchange rate, central parities or oil futures have been calculated.

The smaller the ratio, the higher the quality of the Commission forecast compared to the naïve alternative. If the THEIL statistics are larger than one, the competing forecasts are better.

The key short-term interest rate in the EU (before 1999, the 3-month DEM rate, afterwards 3-month EUR rate) is better set within the Commission procedure compared to the two naïve alternatives examined. The same is true for the other key rate in the forecasting system, namely the US short rate, but its superiority is less pronounced in the case of the year ahead forecasts. The superiority of the Commission approach to setting long-term interest rates is not confirmed for year ahead US long rates (see table 4) which appear to be better forecast by keeping the long rate unchanged compared to the previous year or by assuming an average.

Setting the USD exchange rate is a key assumption in the Commission forecasting procedure. First it was formulated against the DEM; since the euro has been introduced in 1999, the EUR/USD is the focus of the attention. It appears that naïve alternatives, also forward exchange rates, cannot do better than the Commission technical assumption.

In the case of oil prices, the Commission procedure is better than assuming no change or a return to the long-term average, but the mistake is similar to one obtained using oil future prices. Future prices have been available only since 1989 and in this light the result is less robust than in the case of a no-change assumption or a return to trend.

At the country level, the interest and exchange rate assumptions as formulated by the Commission for the currencies which have belonged or still belong to an exchange rate arrangement outperform the examined alternatives. Setting the value of the Dutch guilder is, however, an exception: using a forward rate and the central parity would do better for the current year assumption (THEIL3, THEIL4 are larger than one, see table 3) and using the trend

exchange rate change or the central parity would do better in the case of the year ahead assumption (THEIL2 and THEIL4 are larger than one, see table 4). Also the use of the central parity for the period that the escudo belonged to the ERM would have done better in the year ahead exchange rate assumption compared to calculation that the Commission usually followed (THEIL4 is larger than one, see table 4).

In sum, the Commission procedure for setting external assumption is in general better compared to the alternatives examined. Forward rates and central parities, where available, are not very reliable alternatives. Nevertheless, more attention could be paid to oil futures. The relative accuracy of the Commission projections tends to deteriorate for the year ahead, in particular when considering Commission figures with regard to the 'no change' naïve alternative. This should come as no surprise given the random walk nature of some of the variables under study. Furthermore, by construction the 'no change' alternative for the current year is disadvantaged because it refers to the previous year, while in the Commission approach information can be taken into account for the ongoing year in the beginning of the Spring forecasting exercise.

A final remark concerns the naivety of the 'no change' assumption for the financial variables examined here. It is not that naïve considering that exchange rates and interest rates follow a random walk, implying that the best forecast is the previous observation (Meese, R. and K. Rogoff, 1983). This finding is, however, usually confined to levels and high frequency data.

Figure 2: Short-term interest rates – current year

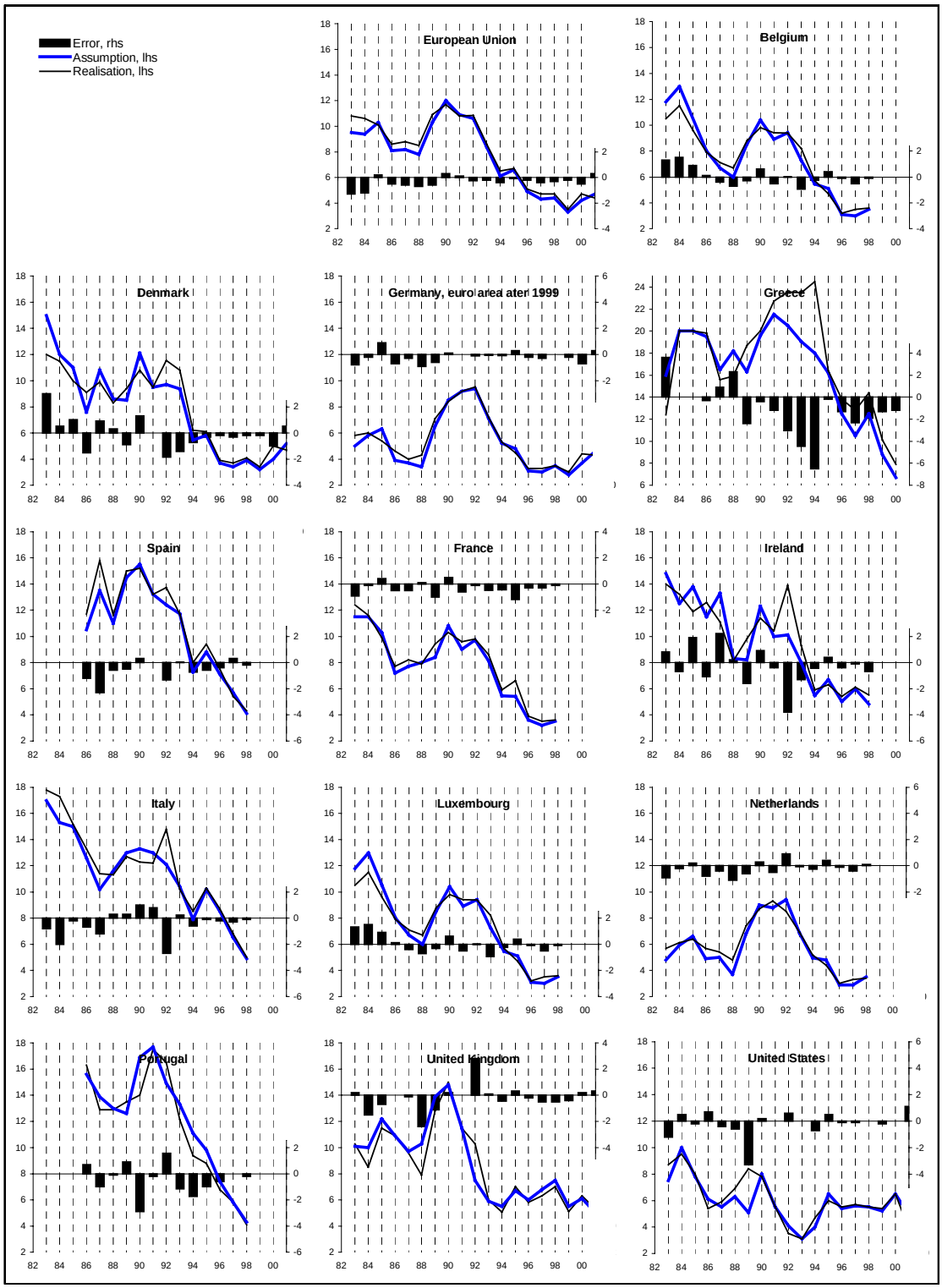


Figure 3: Short-term interest rates – year ahead

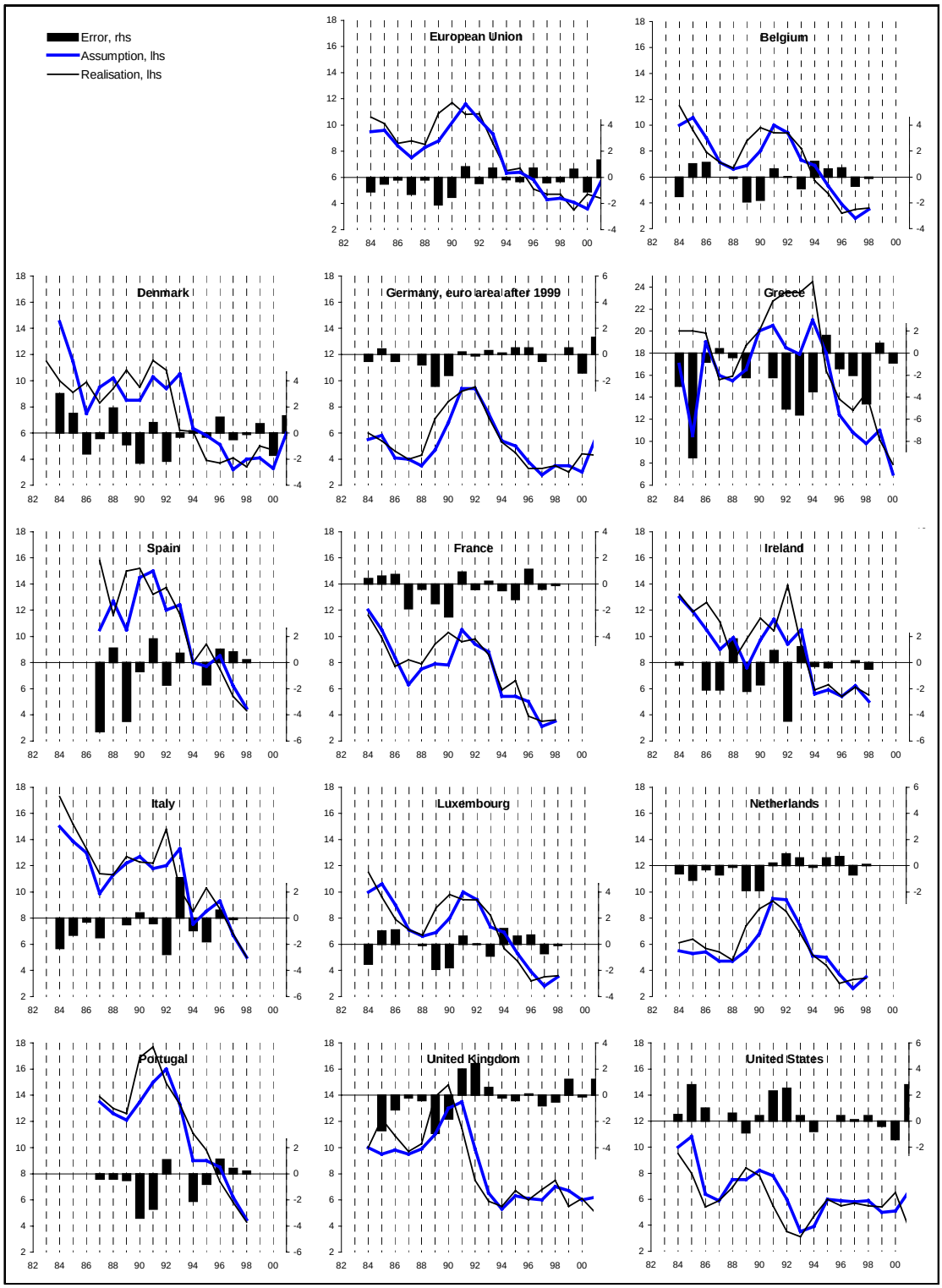


Figure 4: Long-term interest rates – current year

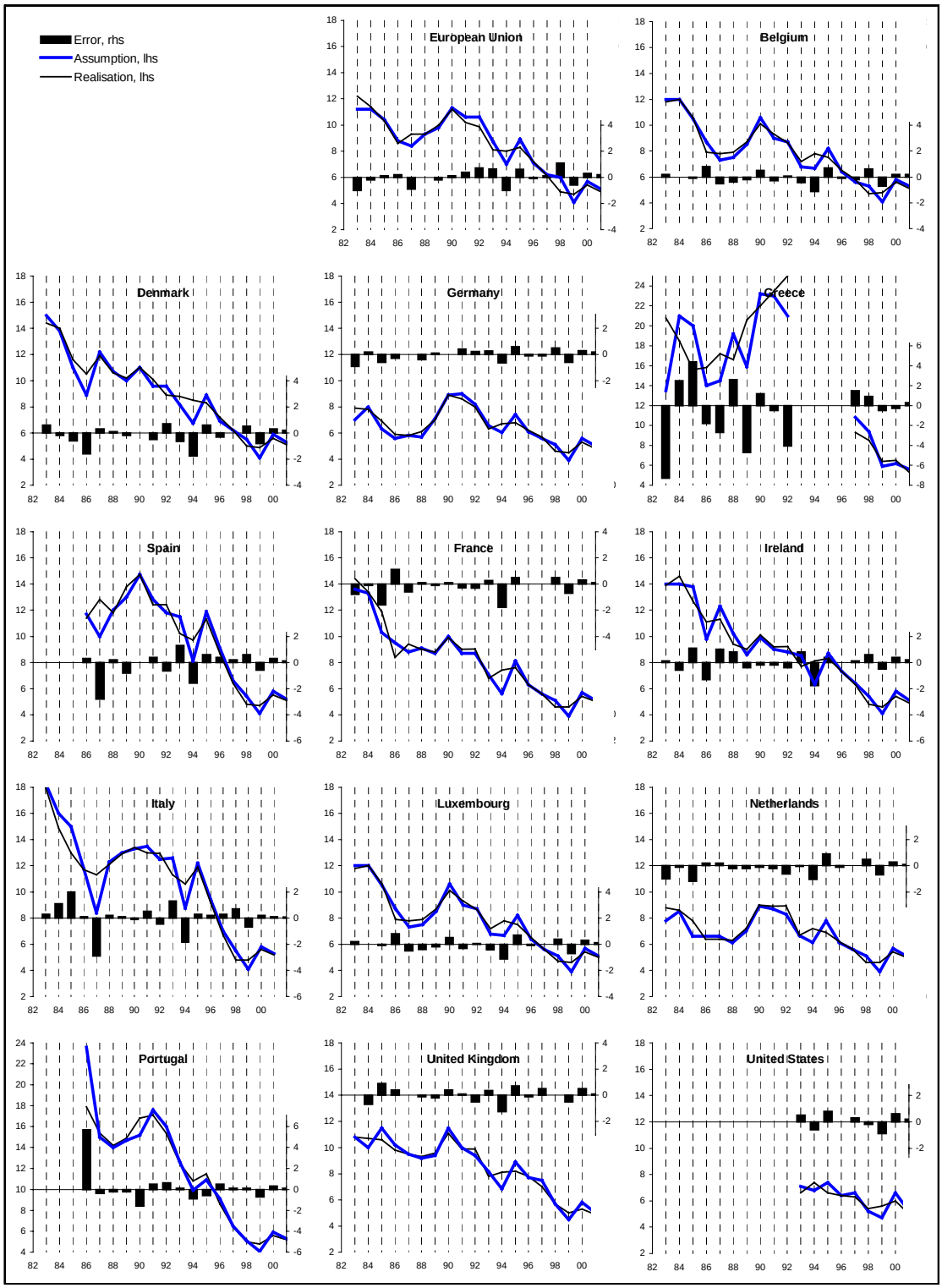


Figure 5: Long-term interest rates – year ahead

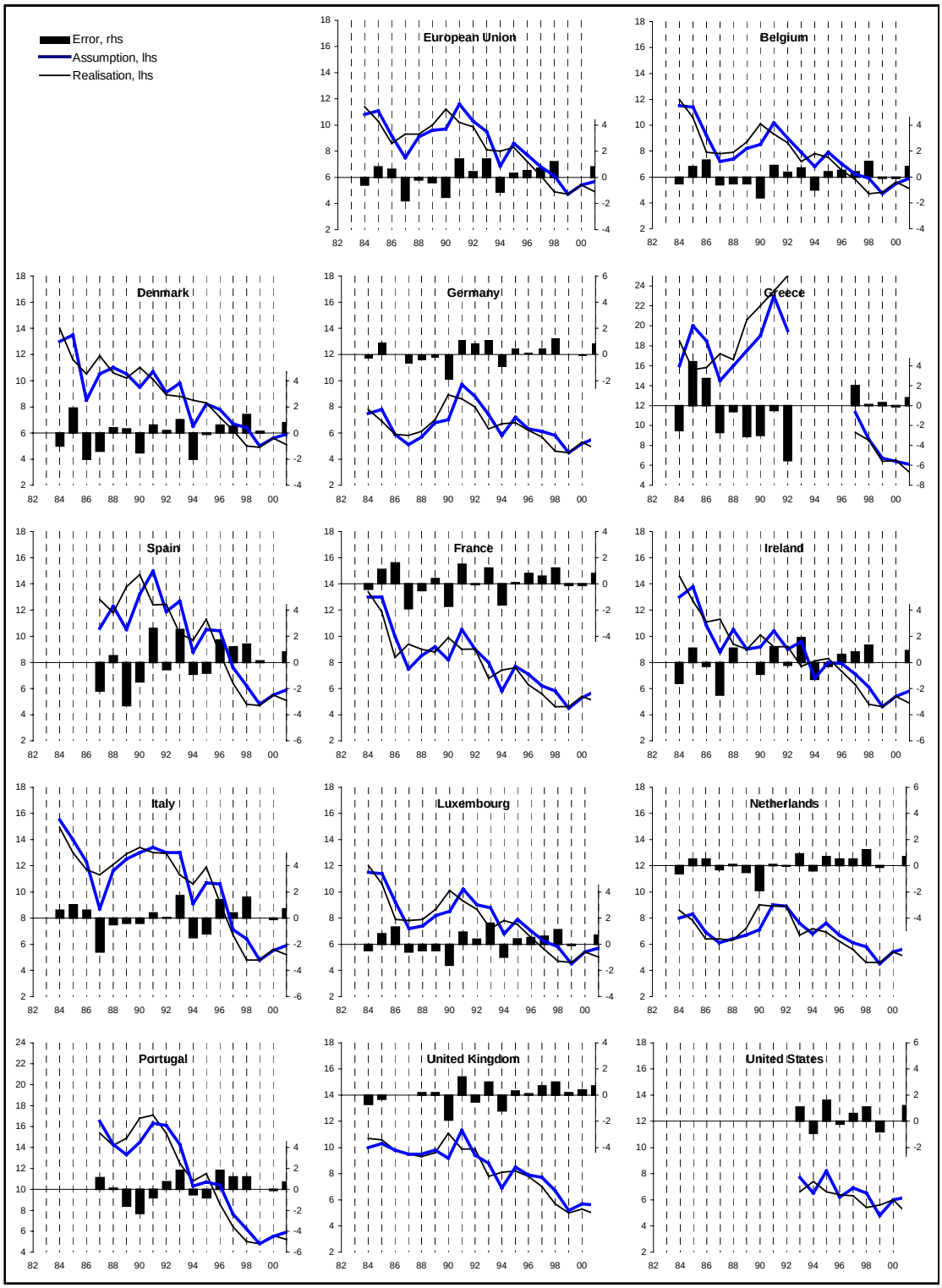


Figure 6: Exchange rates – current year

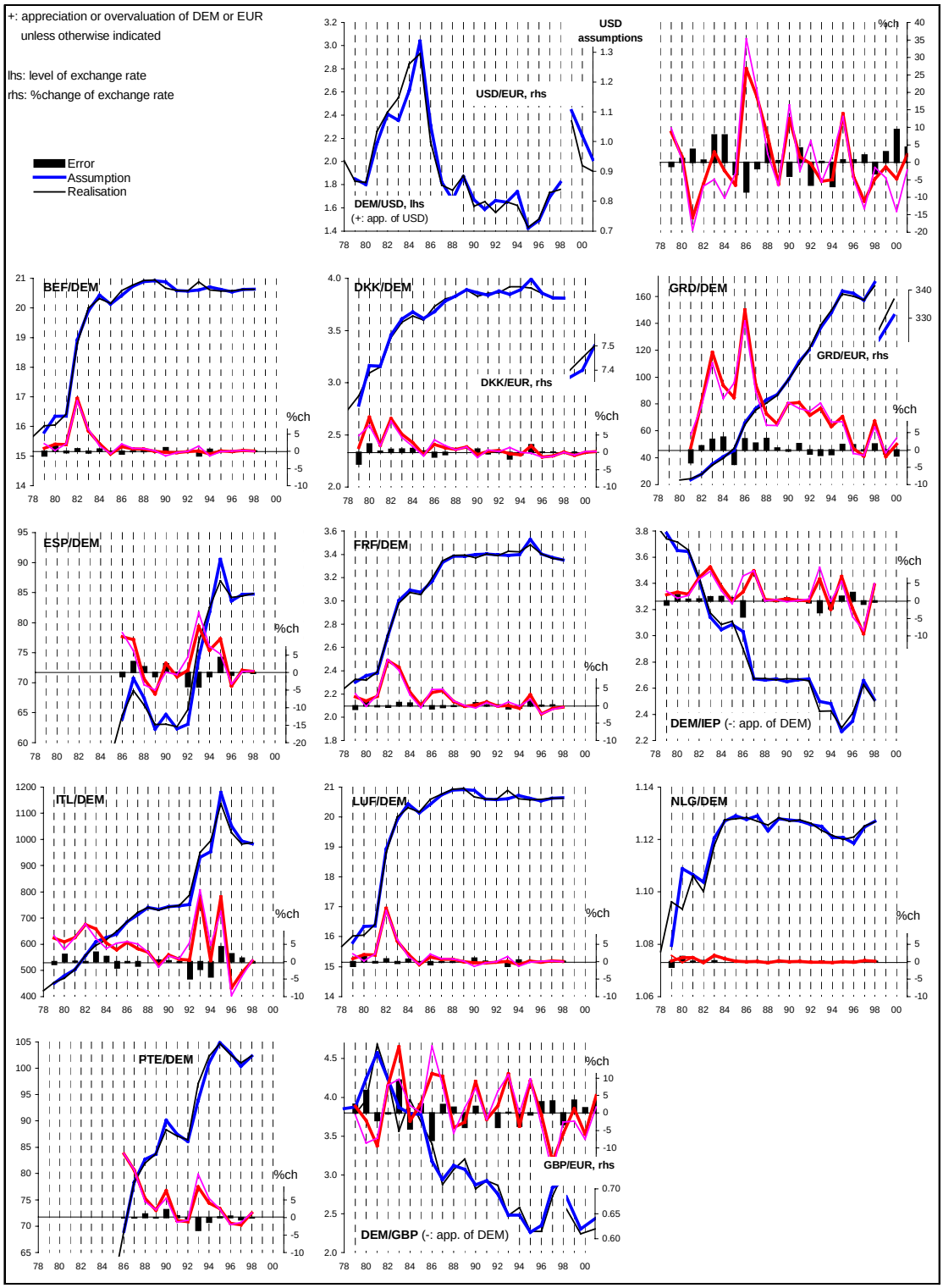


Figure 7: Exchange rates – year ahead

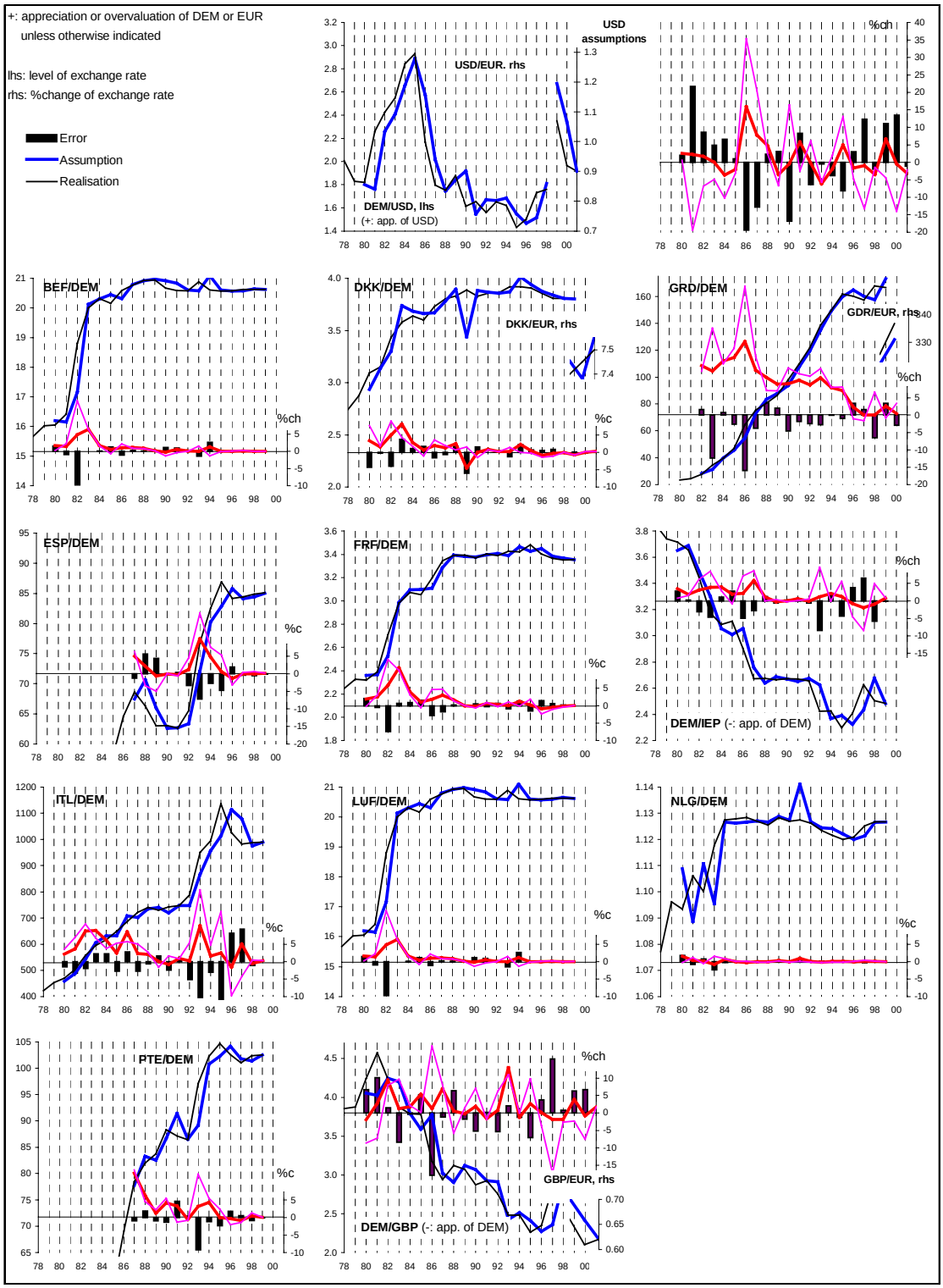
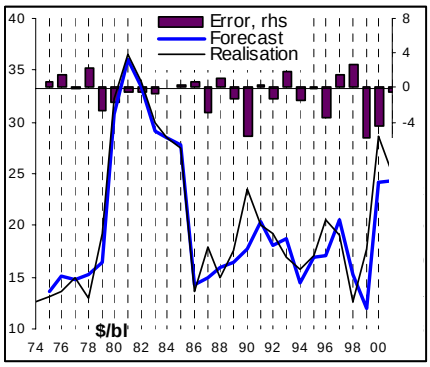
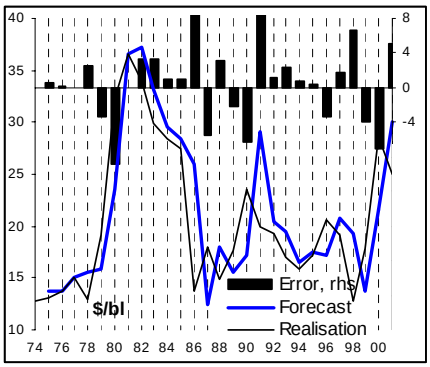


Figure 8: Oil prices – current year, year ahead

current year



year ahead



VII. Persistence of forecast errors

Absence of correlation between prediction errors is a desirable property. It means that once an error is made, it does not feed into the next forecast. It disappears or the next error bears no relation to previous mistakes. If a systematic relation between errors would exist, it could be exploited to improve the forecast.

The null hypothesis of no serial correlation among the forecast errors can be tested with the Ljung-Box Q-statistic. The significance levels of absence of correlation up to three orders, are reported in tables 5 and 6.

Table 5: Persistence in current year forecast error

Key assumptions											
	Short interest rates			**Long interest rates**			**USD[2] against DEM, EUR after 1999**			**Brent crude**	
	D[1]	**EU**	**US**	**D**	**EU**	**US**				**USD/barrel**	
Signif ρ_1=0	0.60	0.44	0.88	0.11	0.35	0.13	0.45			0.63	
Signif ρ_2=0	0.53	0.55	0.98	0.14	0.64	0.32	0.59			0.45	
Signif ρ_3=0	0.73	0.76	0.36	0.17	0.78	0.49	0.60			0.66	
Other assumptions											
Short-term interest rates, % p.a. (BEF = LUF)											
	B	**DK**	**EL**	**E**	**F**	**IRL**	**I**	**L**	**NL**	**P**	**UK**
Signif ρ_1=0	0.04	0.76	0.11	0.45	0.11	0.72	0.72	0.04	0.87	0.40	0.42
Signif ρ_2=0	0.10	0.89	0.18	0.74	0.25	0.92	0.93	0.10	0.90	0.08	0.65
Signif ρ_3=0	0.16	0.97	0.25	0.72	0.36	0.91	0.98	0.16	0.69	0.06	0.81
Long-term interest rates, % p.a											
	B	**DK**	**EL**	**E**	**F**	**IRL**	**I**	**L**	**NL**	**P**	**UK**
Signif ρ_1=0	0.10	0.34	0.30	0.07	0.01	0.01	0.60	0.12	0.11	0.83	0.04
Signif ρ_2=0	0.21	0.33	0.21	0.09	0.02	0.03	0.60	0.26	0.15	0.93	0.10
Signif ρ_3=0	0.25	0.50	0.21	0.18	0.04	0.06	0.62	0.39	0.28	0.98	0.15
Exchange rates[2], annual % change against DEM, EUR after 1999 (BEF = LUF)											
	BEF	**DKK**	**GRD**	**ESP**	**FRF**	**IEP**	**ITL**	**LUF**	**NLG**	**PTE**	**GBP**
Signif ρ_1=0	0.04	0.31	0.67	0.59	0.39	0.65	0.47	0.04	0.03	0.28	0.10
Signif ρ_2=0	0.10	0.56	0.67	0.48	0.40	0.30	0.77	0.10	0.08	0.54	0.25
Signif ρ_3=0	0.08	0.69	0.65	0.58	0.55	0.29	0.33	0.08	0.16	0.17	0.36

[1] D = euro area from 1999
[2] + = appreciation of DEM or EUR
The test for serial correlation is based on the Ljung-Box Q statistic, which is asymptotically distributed as χ^2. The significance level of the null hypothesis of absence of autocorrelation up to three lags is reported. Numbers above 0.05 indicate no serial correlation at the 5 % significance level.

In general serial correlation does not appear to be a serious problem in the fixing of the external assumption, although the p-values for this affirmation are in some cases not very high, especially in the case of the assumptions for the current year, despite the fact that associated errors are usually smaller than in the case of the year ahead.

The key external assumptions, by which are meant short and long-term interest rates for the euro area (before Germany) and for the US, the exchange rate against the USD (first of the DEM, from 1999 of the EUR) and the oil price, are relatively well fixed from the point of serial correlation. Only in the case of long-term interest rates absence of serial correlation is not firmly established, notably for the US in the year ahead.

Table 6: Persistence in year ahead forecast error

Key assumptions											
	Short interest rates			**Long interest rates**			**USD[2] against DEM, EUR after 1999**			**Brent crude**	
	D[1]	**EU**	**US**	**D**	**EU**	**US**				**USD/barrel**	
Signif ρ_1=0	0.63	0.57	0.67	0.70	0.56	0.05	0.37			0.33	
Signif ρ_2=0	0.83	0.57	0.43	0.89	0.85	0.14	0.66			0.33	
Signif ρ_3=0	0.94	0.50	0.46	0.92	0.95	0.20	0.64			0.49	
Other assumptions											
Short-term interest rates, % p.a. (BEF = LUF)											
	B	**DK**	**EL**	**E**	**F**	**IRL**	**I**	**L**	**NL**	**P**	**UK**
Signif ρ_1=0	0.62	0.52	0.66	0.24	0.71	0.04	0.14	0.62	0.11	0.41	0.15
Signif ρ_2=0	0.52	0.49	0.41	0.37	0.93	0.12	0.25	0.52	0.28	0.10	0.21
Signif ρ_3=0	0.65	0.34	0.28	0.37	0.99	0.06	0.14	0.65	0.47	0.20	0.27
Long-term interest rates, % p.a											
	B	**DK**	**EL**	**E**	**F**	**IRL**	**I**	**L**	**NL**	**P**	**UK**
Signif ρ_1=0	0.87	0.28	0.69	0.68	0.18	0.16	0.98	0.72	0.71	0.11	0.07
Signif ρ_2=0	0.82	0.46	0.90	0.85	0.38	0.35	0.74	0.93	0.85	0.14	0.05
Signif ρ_3=0	0.89	0.63	0.85	0.92	0.58	0.26	0.86	0.72	0.93	0.12	0.05
Exchange rates[2], annual % change against DEM, EUR after 1999 (BEF = LUF)											
	BEF	**DKK**	**GRD**	**ESP**	**FRF**	**IEP**	**ITL**	**LUF**	**NLG**	**PTE**	**GBP**
Signif ρ_1=0	0.95	0.16	0.61	0.10	0.63	0.29	0.56	0.95	0.23	0.88	0.75
Signif ρ_2=0	0.73	0.23	0.47	0.21	0.29	0.27	0.83	0.73	0.17	0.40	0.46
Signif ρ_3=0	0.84	0.29	0.43	0.33	0.30	0.45	0.91	0.84	0.11	0.60	0.24

[1] D = euro area from 1999
[2] + = appreciation of DEM or EUR
The test for serial correlation is based on the Ljung-Box Q statistic, which is asymptotically distributed as χ^2. The significance level of the null hypothesis of absence of autocorrelation up to three lags is reported. Numbers above 0.05 indicate no serial correlation at the 5 % significance level.

Assumptions concerning participants in the exchange rate arrangement, do not in general display persistent errors, but there some exceptions. In the current year Belgian (and Luxembourg) short-term interest rates and exchange rates, as well as French long-term interest rate represent problems. Depending on time horizon and maturity, serial correlation is also found in Irish and UK interest rates.

VIII. Unbiasedness

The Commission forecasts are often accused of being too rosy. In an earlier study focussing on the forecast accuracy of some real variables and covering the period until 1997 (Keereman, 1999, p 47), it was found that there was no evidence of presenting an overly optimistic forecast. Especially from the eighties onward the contrary can be observed in several Member States. There was a tendency to underestimate real GDP growth, overestimate inflation and overestimate unemployment. The critique against the Commission forecasts as being too rosy was attributed to some evidence of denying the cycle: a slowdown is always moderate and an expansion is too easily extrapolated. The possibility of an optimistic bias for forecasts beyond the coming year should not be transposed on the current year and year ahead predictions for which that study did in general not find such a bias. It should be stressed that the year 2001 was

not included in that study, when the Commission Spring Forecasts made a large prediction error for the current year. At that moment average EU growth in 2001 was projected to be 2.8 %, while the outcome was only 1.7 %; this was an overestimation of 1.1 %, compared to an historical average of 0.5 %.

External assumptions could also be coloured for various reasons. A first rationale for this behaviour could be the belief/attempt to influence the course of events, hoping that economic agents will adjust their expectations and act accordingly. This is the theory of the self fulfilling prophecy. It would mean that interest rates and oil prices are forecast systematically too low. Depending on whether growth or inflation (credibility of monetary policy) is at stake, exchange rates should be set too weak or too strong.

Second, while projecting a too optimistic picture is in general the accusation, it can also go in the other direction. Public authorities could have an interest to present a more pessimistic – for that matter prudent – forecast in order to trigger a policy reaction. The attempt is to produce a self-destroying forecast. The purpose could also be to realise at pre-set policy targets. This could notably be the case in budgetary forecasting, where a safety margin is built in by assuming overly high interest rates. Budgetary targets could be met, also in the case of slippage in government revenues or expenditures.

A third motive could to be to use the fixing of the external assumptions as scapegoat for prediction errors committed on the headline forecast variables like GDP, inflation, export, import and public finances.

The issue at stake is the absence of bias. It means that on average the forecast error is zero or in other words that there is no systematic over- or underestimation. It can be formally examined by regressing the error ($e = F - R$) on a constant (α) and an error term (μ).

$$e = \alpha + \mu$$

and testing the null hypothesis

$$H_o: \alpha = 0$$

In tables 7 and 8 the average forecast error is given (the estimate of the constant) and the probability value of the null hypothesis. It is customary to accept the null hypothesis if the probability value is larger than 0.05.

As far as the key assumptions are concerned, there seems to be a tendency to present optimistic assumptions from a European perspective, but the bias is not significant. German short-term interest rates tended to be underestimated, in the late eighties, but also the 3-month euro rate for the three observations available (see figure 2 and 3). By contrast, US short rates for the year ahead are set too high and this is not only a shift in sign between the current year and year ahead forecast, but the 0.59 % overestimation is coming close to significant. Underestimation of long rates can be firmly rejected, while there is even a tendency to overestimate US long rates. The German mark and euro were on average overvalued against the US dollar; the DM overvaluation was mainly a phenomenon of the early eighties when the US dollar surged. The oil price is underestimated in the current year by about ¾ of a dollar and, given the low p-value, the absence of bias is not firmly established. This underestimation disappears in the year ahead, but the overestimation of 0.6 dollar per barrel does not appear significant.

Table 7: Bias - current year

Key assumptions												
	Short interest rates			Long interest rates			USD[2] against DEM, EUR after 1999			Brent crude		
	D[1]	EU	US	D	EU	US				USD/barrel		
α	-0.19	-0.35	-0.17	-0.05	0.02	0.08	0.68			-0.77		
Signif α=0	0.08	0.00	0.44	0.64	0.86	0.69	0.50			0.08		
Other assumptions												
Short-term interest rates, % p.a. (BEF = LUF)												
	B	DK	EL	E	F	IRL	I	L	NL	P	UK	
α	0.06	-0.06	-1.09	-0.56	-0.35	-0.26	-0.39	0.06	-0.21	-0.44	-0.20	
Signif α=0	0.72	0.83	0.06	0.02	0.01	0.48	0.12	0.72	0.12	0.20	0.40	
Long-term interest rates, % p.a												
	B	DK	EL	E	F	IRL	I	L	NL	P	UK	
α	-0.04	-0.17	-0.56	-0.13	-0.18	0.01	0.07	-0.04	-0.18	0.22	0.03	
Signif α=0	0.71	0.28	0.49	0.61	0.28	0.97	0.76	0.70	0.17	0.59	0.80	
Exchange rates[2], annual % change against DEM, EUR after 1999 (BEF = LUF)												
	BEF	DKK	GRD	ESP	FRF	IEP	ITL	LUF	NLG	PTE	GBP	
α	-0.02	0.05	0.39	-0.04	0.07	-0.11	-0.09	-0.02	0.01	-0.18	0.48	
Signif α=0	0.92	0.85	0.45	0.96	0.68	0.77	0.85	0.92	0.91	0.63	0.57	

[1] D = euro area from 1999
[2] + = appreciation of DEM or EUR
α: coefficient in the regression $e = \alpha + \mu$ where is e is the forecast error.
Signif α=0: significance level of the t-statistic for α=0. Numbers above 0.05 indicate absence of bias at the 5 % significance level.

With respect to assumptions for members of the exchange rate arrangement, a bias is not present in long-term interest and exchange rates. However, there seems to be a problem in the setting of some short-term interest rates for the current year. Spanish and French short-term rates are in a significant way underestimated and for the EU as a whole the underestimation by 35 basis points is also significant. The significance of the bias disappears in the year ahead forecasts. It is noteworthy that there is a general tendency to overestimate the exchange rate of the former ERM participants against the DEM, but this is not the case for the GBP.

Table 8: Bias – year ahead

Key assumptions												
	Short interest rates			Long interest rates			USD[2] against DEM, EUR after 1999			Brent crude		
	D[1]	EU	US	D	EU	US				USD/barrel		
α	-0.22	-0.31	0.59	0.13	0.14	0.41	1.25			0.50		
Signif α=0	0.30	0.16	0.06	0.51	0.54	0.22	0.56			0.59		
Other assumptions												
Short-term interest rates, % p.a. (BEF = LUF)												
	B	DK	EL	E	F	IRL	I	L	NL	P	UK	
α	-0.12	0.02	-2.25	-0.69	-0.33	-0.67	-0.52	-0.12	-0.29	-0.63	-0.20	
Signif α=0	0.66	0.96	0.00	0.31	0.24	0.13	0.17	0.66	0.23	0.16	0.55	
Long-term interest rates, % p.a												
	B	DK	EL	E	F	IRL	I	L	NL	P	UK	
α	0.14	-0.01	-0.55	0.10	0.16	0.10	0.10	0.19	0.10	0.17	0.09	
Signif α=0	0.48	0.97	0.45	0.81	0.52	0.72	0.72	0.35	0.54	0.60	0.65	
Exchange rates[2], annual % change against DEM, EUR after 1999 (BEF = LUF)												
	BEF	DKK	GRD	ESP	FRF	IEP	ITL	LUF	NLG	PTE	GBP	
α	-0.28	-0.18	-2.12	-0.65	-0.27	-0.70	-1.01	-0.28	0.01	-0.61	0.74	
Signif α=0	0.61	0.71	0.09	0.51	0.57	0.41	0.38	0.61	0.95	0.50	0.63	

[1] D = euro area from 1999
[2] + = appreciation of DEM or EUR
α: coefficient in the regression $e = \alpha + \mu$ where is e is the forecast error.
Signif α=0: significance level of the t-statistic for α=0. Numbers above 0.05 indicate absence of bias at the 5 % significance level.

Summing up, there is a tendency to set favourable external assumptions, but in general it is not significant in a statistical sense. Indeed currencies (DEM or EUR against USD and ERM currencies against DEM) are presented somewhat stronger than they afterwards turn out to be. Long-term interest rates and oil prices tend to be projected lower for the current year than what is verified later, but this is not significant and there is a shift from underestimation to overestimation when the forecast horizon lengthens. Only in the case of short-term interest rates set for the current year are there a number of cases where rates are significantly too low.

IX. Efficiency

Forecasts are efficient if all information available in the data is used. Even if it is not the objective of the external assumptions to be correct (as they are not forecasts), inefficiency should be avoided. It would indicate that an assumption is formulated in relation to past errors, rather than based on some economic logic.

Weak efficiency can be tested with the realisation-forecast equation

$R = \alpha + \beta F + \mu$

where the null hypothesis is

H_o: $\alpha = 0$ *and* $\beta = 1$

The purpose is to examine whether in making an assumption there is unexplored information in the reference data set which is in the framework of this test usually limited to the past realisation and forecast series and the associated prediction errors. The coefficient of determination ($\bar{R}^2$) gives an idea how well the assumption is made.

If α is significantly different form zero and β significantly different from unity, the forecast is correlated with the forecast error and the forecast can be improved exploiting this information. In the tables both the probability values for the restrictions imposed on the coefficients separately (t-test) and jointly (F-test) are given. The appropriate test is the latter one as the estimates of α and β are likely to be correlated (Wallis, 1989). Attention should also be paid to the presence of serial correlation in the error terms which makes hypothesis testing less reliable. The analysis of the persistence of the forecast errors (section VII) and the Durbin Watson statistic (DW), which should be close to two, in this section give indications on this issue.

The key assumptions are set in an efficient way, except US interest rates for the year ahead. With an $\bar{R}^2$ of 0.10 only 10 % of the variance of long-term US interest rates is correctly forecast in the year ahead, but not too much significance should be attached to this observation given the small sample on which the analysis of the accuracy of US long-term interest rates forecast for the year ahead could be done (see table 2 and figure 5). The sample for year ahead US short-term interest rates is longer implying that the test statistics should be more reliable and they suggest (see table 8) that the efficiency of the point forecast could be improved. The tendency of predicting too high US short-term interest rate in the year ahead, hinted already at that possibility to overestimate (see table 6). The $\bar{R}^2$ for the current year assumptions is relatively high, but drops for the year ahead, notably in the case of the USD exchange rate, where only 38 % of the variance of the appreciation or depreciation is correctly predicted.

Table 9: Efficiency – current year

Key assumptions												
	Short interest rates			Long interest rates			USD[2] against DEM, EUR after 1999			Brent crude		
	D[1]	EU	US	D	EU	US				USD/barrel		
α	0.55	0.31	0.51	0.67	-0.05	2.29	-0.83			0.99		
Signif α=0	0.06	0.34	0.56	0.17	0.92	0.07	0.40			0.49		
β	0.93	1.01	0.94	0.90	1.00	0.62	1.15			0.99		
Signif β=1	0.17	0.90	0.69	0.20	0.96	0.06	0.14			0.87		
Signif α=0, β=1	0.08	0.01	0.69	0.38	0.98	0.14	0.26			0.23		
$\bar{R}^2$	0.95	0.97	0.71	0.90	0.93	0.60	0.86			0.89		
DW	1.96	1.30	1.77	2.20	2.24	2.32	1.81			2.15		
Other assumptions												
Short-term interest rates, % p.a. (BEF = LUF)												
	B	**DK**	**EL**	**E**	**F**	**IRL**	**I**	**L**	**NL**	**P**	**UK**	
α	1.08	1.41	1.33	0.13	0.61	1.73	-0.05	1.08	0.82	1.15	0.44	
Signif α=0	0.01	0.02	0.56	0.85	0.11	0.12	0.96	0.01	0.04	0.27	0.56	
β	0.85	0.83	0.99	1.04	0.97	0.84	1.04	0.85	0.89	0.94	0.97	
Signif β=1	0.00	0.02	0.92	0.51	0.45	0.16	0.63	0.00	0.10	0.46	0.73	
Signif α=0, β=1	0.02	0.06	0.18	0.05	0.03	0.29	0.28	0.02	0.08	0.34	0.67	
$\bar{R}^2$	0.96	0.89	0.76	0.96	0.97	0.81	0.92	0.96	0.94	0.92	0.88	
DW	0.92	1.47	1.06	1.59	2.60	2.06	2.23	0.92	1.71	2.29	1.55	
Long-term interest rates, % p.a												
	B	**DK**	**EL**	**E**	**F**	**IRL**	**I**	**L**	**NL**	**P**	**UK**	
α	0.50	0.62	1.42	0.23	-0.01	0.43	1.01	0.48	0.09	1.56	0.50	
Signif α=0	0.24	0.24	0.53	0.78	0.98	0.44	0.16	0.23	0.90	0.08	0.33	
β	0.94	0.95	0.94	0.99	1.02	0.95	0.90	0.94	1.01	0.85	0.94	
Signif β=1	0.27	0.38	0.68	0.90	0.71	0.41	0.11	0.26	0.89	0.03	0.29	
Signif α=0, β=1	0.50	0.38	0.73	0.88	0.54	0.70	0.26	0.48	0.40	0.09	0.54	
$\bar{R}^2$	0.95	0.94	0.77	0.91	0.94	0.94	0.93	0.96	0.86	0.92	0.94	
DW	2.58	2.13	2.01	2.77	3.13	2.93	2.08	2.54	2.59	1.18	2.71	
Exchange rates[2], annual % change against DEM, EUR after 1999 (BEF = LUF)												
	BEF	**DKK**	**GRD**	**ESP**	**FRF**	**IEP**	**ITL**	**LUF**	**NLG**	**PTE**	**GBP**	
α	0.07	0.20	0.90	0.13	-0.05	0.19	0.37	0.07	0.05	0.12	-0.32	
Signif α=0	0.69	0.44	0.20	0.87	0.80	0.67	0.56	0.69	0.65	0.81	0.71	
β	0.96	0.83	0.88	0.97	0.99	0.96	0.94	0.96	0.72	1.01	0.90	
Signif β=1	0.42	0.04	0.02	0.81	0.85	0.70	0.45	0.42	0.17	0.82	0.38	
Signif α=0, β=1	0.71	0.11	0.05	0.97	0.90	0.89	0.73	0.71	0.37	0.87	0.57	
$\bar{R}^2$	0.95	0.84	0.95	0.84	0.96	0.85	0.88	0.95	0.40	0.95	0.76	
DW	2.64	1.75	1.83	1.63	2.26	1.76	1.42	2.64	2.48	1.44	2.40	

[1] D = euro area from 1999
[2] + = appreciation of DEM or EUR
α and β: coefficients in the regression $R = \alpha + \beta F + \mu$
Signif (.): significance level of the t-statistic (single test) or F-statistic (joint test) of the null hypothesis; numbers above 0.05 indicate that the null hypothesis can be accepted at the 5 % significance level.

With the exception of current year short-term interest rate, the other assumptions appear also to be efficiently formulated. Serial correlation among errors in Belgian (and Luxembourg) short-term interest rates assumptions (see table 5) and bias in Spanish, French and overall EU short-term interest assumptions led to inefficient predictions, which could have been corrected with the coefficients provided by the realisation-forecast equation. Also the NLG/DEM exchange rate assumption was not particularly well made in the ERM as suggested by the low $\bar{R}^2$ for current year assumptions (see table 7) and by the even negative $\bar{R}^2$ in the case of the year ahead which is indicative of a very poor fit (see table 8).

Table 10: Efficiency – year ahead

Key assumptions

	Short interest rates			Long interest rates			USD[2] against DEM, EUR after 1999	Brent crude
	D[1]	EU	US	D	EU	US		USD/barrel
α	0.59	-0.12	1.45	1.32	0.16	3.91	-1.92	4.90
Signif α=0	0.35	0.86	0.17	0.18	0.87	0.05	0.38	0.08
β	0.93	1.06	0.69	0.78	0.96	0.34	1.59	0.75
Signif β=1	0.53	0.53	0.05	0.14	0.76	0.03	0.18	0.05
Signif α=0, β=1	0.49	0.32	0.03	0.26	0.79	0.04	0.34	0.11
$\bar{R}^2$	0.80	0.89	0.55	0.63	0.81	0.10	0.38	0.59
DW	1.50	2.19	1.55	1.76	2.09	1.80	1.80	2.09

Other assumptions

Short-term interest rates, % p.a. (BEF = LUF)

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
α	0.25	1.25	3.41	0.88	1.10	0.93	0.33	0.25	0.78	-0.59	-0.49
Signif α=0	0.78	0.18	0.22	0.71	0.22	0.56	0.83	0.78	0.30	0.68	0.69
β	0.98	0.83	0.92	0.98	0.90	0.97	1.02	0.98	0.91	1.11	1.08
Signif β=1	0.88	0.14	0.66	0.93	0.36	0.86	0.90	0.88	0.48	0.38	0.56
Signif α=0, β=1	0.90	0.33	0.02	0.61	0.33	0.33	0.40	0.90	0.38	0.26	0.71
$\bar{R}^2$	0.83	0.78	0.65	0.64	0.83	0.69	0.80	0.83	0.80	0.88	0.78
DW	1.62	1.84	1.63	2.17	2.02	2.89	2.62	1.62	1.15	1.85	1.39

Long-term interest rates, % p.a

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
α	0.05	0.21	-0.82	0.03	0.55	-0.26	0.29	0.11	-0.41	-0.76	-0.54
Signif α=0	0.96	0.84	0.70	0.98	0.55	0.81	0.75	0.90	0.69	0.42	0.58
β	0.98	0.98	1.09	0.99	0.91	1.02	0.96	0.96	1.04	1.05	1.05
Signif β=1	0.82	0.84	0.49	0.93	0.42	0.88	0.66	0.73	0.77	0.50	0.64
Signif α=0, β=1	0.76	0.98	0.59	0.97	0.59	0.93	0.85	0.62	0.80	0.69	0.81
$\bar{R}^2$	0.84	0.81	0.84	0.75	0.81	0.82	0.89	0.83	0.75	0.93	0.84
DW	1.95	2.31	1.77	2.01	2.38	2.52	1.88	2.02	1.82	1.33	2.92

Exchange rates[2], annual % change against DEM, EUR after 1999 (BEF = LUF)

	BEF	DKK	GRD	ESP	FRF	IEP	ITL	LUF	NLG	PTE	GBP
α	-0.43	0.50	-1.17	-0.41	-0.08	0.01	0.61	-0.43	0.17	0.50	-0.94
Signif α=0	0.47	0.34	0.58	0.66	0.88	0.99	0.70	0.47	0.19	0.66	0.60
β	1.68	0.71	1.36	1.65	1.21	1.46	1.13	1.68	-0.19	1.04	1.10
Signif β=1	0.04	0.15	0.07	0.03	0.23	0.30	0.70	0.04	0.00	0.88	0.81
Signif α=0, β=1	0.09	0.33	0.05	0.08	0.41	0.42	0.64	0.09	0.00	0.80	0.87
$\bar{R}^2$	0.62	0.37	0.74	0.76	0.72	0.35	0.37	0.62	-0.02	0.57	0.22
DW	2.59	2.10	2.53	1.25	2.42	2.48	1.76	2.59	2.13	2.07	1.90

[1] D = euro area from 1999
[2] + = appreciation of DEM or EUR
α and β: coefficients in the regression $R = \alpha + \beta F + \mu$
Signif (.): significance level of the t-statistic (single test) or F-statistic (joint test) of the null hypothesis; numbers above 0.05 indicate that the null hypothesis can be accepted at the 5 % significance level.

In sum, the external assumptions are relatively well formulated, but it appears that current year short-term interest rate assumptions could be improved as suggested by the relatively high $\bar{R}^2$ by exploiting better the information available in past mistakes. By contrast, the efficiency of setting the NLG/DEM exchange would have been difficult to improve based on information in data set used, given the low $\bar{R}^2$. A totally different technical assumption would have been better. In the case of current year assumptions, using the forward exchange rate would have resulted in a lower root mean square error compared to the present approach (see THEIL3 in table 3), while the average exchange rate is indicated as superior in the case of the year ahead. This seems to suggest that assumptions for the more stable currencies (having the lower standard deviation, see table 1 and 2) could be further improved by using another strategy to formulate the exchange rate assumptions.

The relevance of these findings for the formulation of the exchange rate hypotheses of the Candidate Countries which might enter an exchange rate regime has to be put in the proper context. First, one does not know in advance if a currency will be a stable one. Using the

examined alternative methods in the case of more volatile currencies worsens the quality of the assumption. Second, the low mean absolute error in setting the NLG/DEM exchange rate (see table 3 and 4) and the firm rejection of the hypothesis of a bias (see table 7 and 8) can hardly be improved upon. Third, the alternative of a trend exchange rate is not a real option, because its determination is uncertain. In the present study it is represented by the average exchange rate over the sample which is of course not known is a real life situation.

X. Accuracy through time

In this section it is checked whether the Commission formulation of the external assumptions improved over time. The results obtained from the calculation of 5-year moving averages of three key summary statistics are discussed: the mean absolute error, the mean error and the standard deviation (see figure 9).

Accuracy for short-term interest rates has somewhat improved over time. Interestingly, short-term interest rate hypotheses have improved against rather volatile money markets, at least until the mid-nineties, as evidenced by the high moving standard deviation of the underlying variable. The mean error declined, especially in the EU and the general underestimation of interest rates (overestimation of US short rates in the year ahead) became smaller.

There is a small improvement for long rates in the EU and there appears a shift from underestimation to overestimation. US long rates are not examined in this context because the series is too short.

With respect to the USD exchange rate, the mean error did not change much despite lower volatility. Especially noticeable in the year ahead forecasts, there is a clear shift from overestimation to underestimation and again to overestimation of the European reference currency (until 1999 the DEM, then the EUR). Pooling the EU bilateral exchange rates allows us to have an overall idea of the accuracy of the individual bilateral exchange rates. Note that mistakes for intra-EU exchange rates are much smaller and do not display a clear tendency.

Although oil prices seem somewhat less volatile, the error increased.

Figure 9: Accuracy through time

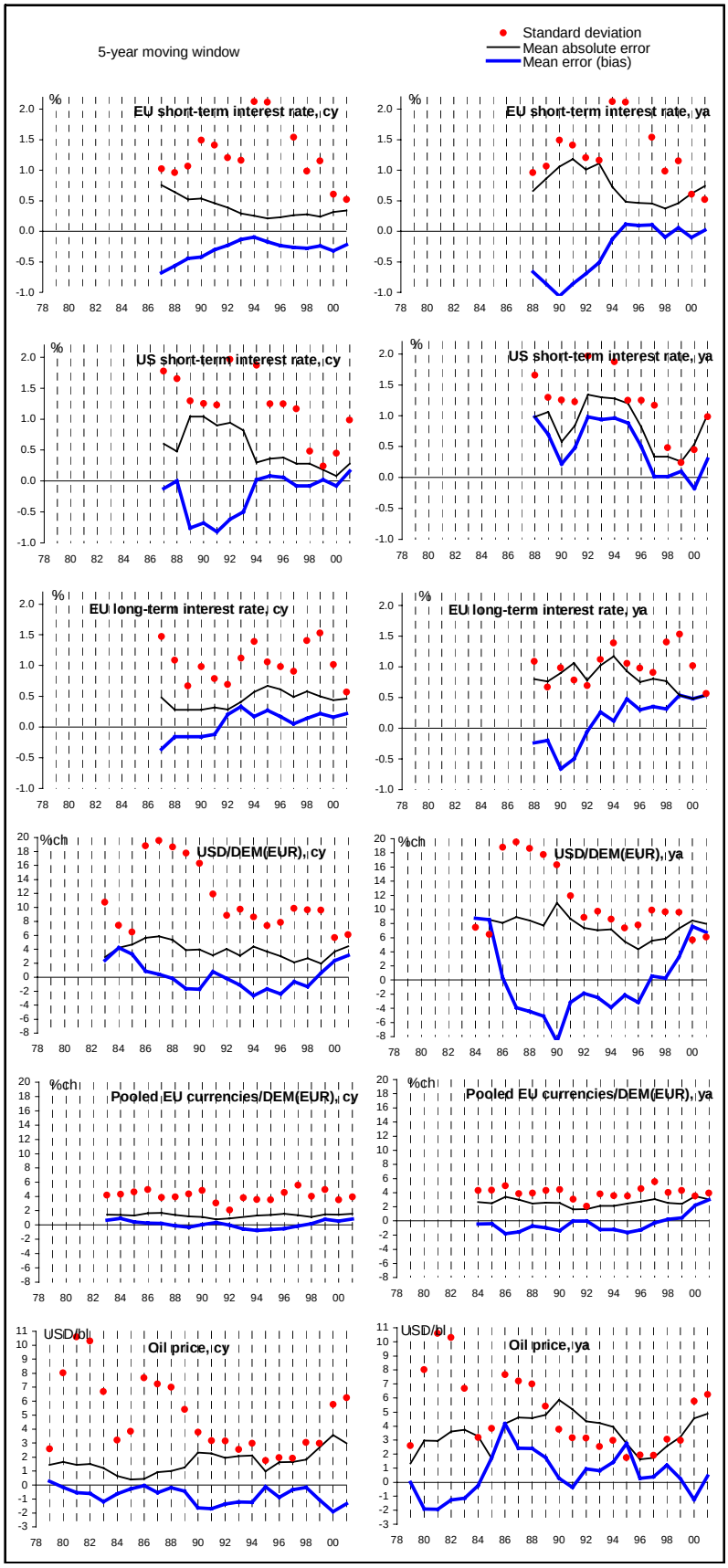


Table 11: Contingency table of directional accuracy – current year

	Short interest rates			Long interest rates			USD against DEM, EUR after 1999	Brent crude
Key assumptions	**D**[1]	**EU**	**US**	**D**	**EU**	**US**		**USD/barrel**
ΔF≥0 and ΔR<0	2	0	0	2	1	2	3	2
ΔF<0 and ΔR≥0	2	3	1	2	1	1	2	1
ΔF<0 and ΔR<0	7	10	9	10	11	3	11	12
ΔF≥0 and ΔR≥0	7	4	7	4	5	2	7	12
Success rate	0.78	0.82	0.94	0.78	0.89	0.63	0.78	0.89
Signif indep	0.02	0.01	0.00	0.03	0.00	0.47	0.01	0.00

Other assumptions

Short-term interest rates, % p.a. (BEF = LUF)

	B	**DK**	**EL**	**E**	**F**	**IRL**	**I**	**L**	**NL**	**P**	**UK**
ΔF≥0 and ΔR<0	1	2	0	0	0	2	3	1	1	1	0
ΔF<0 and ΔR≥0	1	0	3	1	1	2	1	1	1	0	1
ΔF<0 and ΔR<0	9	10	8	7	9	7	9	9	7	9	9
ΔF≥0 and ΔR≥0	4	6	6	4	5	4	2	4	6	2	7
Success rate	0.87	0.89	0.82	0.92	0.93	0.73	0.73	0.87	0.87	0.92	0.94
Signif indep	0.01	0.00	0.00	0.00	0.00	0.09	0.17	0.01	0.00	0.01	0.00

Long-term interest rates, % p.a

	B	**DK**	**EL**	**E**	**F**	**IRL**	**I**	**L**	**NL**	**P**	**UK**
ΔF≥0 and ΔR<0	1	1	4	0	0	0	2	1	1	0	1
ΔF<0 and ΔR≥0	3	0	5	2	3	2	1	2	3	0	2
ΔF<0 and ΔR<0	10	14	2	9	11	11	10	11	10	10	11
ΔF≥0 and ΔR≥0	4	3	2	4	4	5	5	4	4	5	4
Success rate	0.78	0.94	0.31	0.87	0.83	0.89	0.83	0.83	0.78	1.00	0.83
Signif indep	0.03	0.00	0.17	0.00	0.00	0.00	0.01	0.01	0.03	0.00	0.01

Exchange rates[2] **, annual % change against DEM, EUR after 1999** (BEF = LUF)

	BEF	**DKK**	**GRD**	**ESP**	**FRF**	**IEP**	**ITL**	**LUF**	**NLG**	**PTE**	**GBP**
ΔF≥0 and ΔR<0	2	2	1	0	3	2	0	2	2	0	2
ΔF<0 and ΔR≥0	2	2	0	0	1	0	0	2	2	0	3
ΔF<0 and ΔR<0	5	5	2	4	5	4	3	5	7	4	8
ΔF≥0 and ΔR≥0	11	14	17	9	11	14	17	11	9	9	10
Success rate	0.80	0.83	0.95	1.00	0.80	0.90	1.00	0.80	0.80	1.00	0.78
Signif indep	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01

[1] D = euro area from 1999

For each variable the first two rows indicate the number of failures, the next two rows the number of successes. The success rate is the percentage share of successes. Signif indep is the significance level of the χ^2-statistic for independence of forecasts and realisations. With numbers below 0.05 the null hypothesis of independence can be rejected at the 5 % significance level.

XI. Directional accuracy

Up to now the forecast performance was assessed in a quantitative manner. At least as important (Leitch and Tanner, 1991) is to have the direction of the change correct. It is a first step to evaluate the timely prediction of turning points in the evolution of interest and exchange rates or oil prices. Studies of directional accuracy of forecasts can be found in Artis (1996), Ash, Smyth and Heravi (1998), Keereman (1999).

The data can be arranged in a 2x2 contingency table (see Wonacott and Wonacott, 1977):

		outturns <	outturns ≥
forecasts	<	success	failure
	≥	failure	success

The rows indicate a forecast of either a decrease or an increase in the variable under consideration compared to the previous year and the columns do the same for the outturns. A success is obtained when the sign of the forecast change is verified ex post. The first entry on the leading diagonal gives the number of forecast negative changes met by a decline, while the second entry on the leading diagonal combines positive changes in forecasts and realisations. Opposite changes in forecasts and results are a failure. The larger the number of successes, the greater the directional forecast accuracy. A score of at least 50 % correct matches seems a minimum requirement. Otherwise one might as well flip a coin for the fixing of the external assumptions.

Directional accuracy can formally be tested, applying a χ^2-test, if there exists a significant relation between the direction of change of the outturns and the one of the forecasts. If this is not the case, this measure puts a question mark behind the procedure followed to make the external assumptions. On the contrary, if the null hypothesis of independence can be rejected, the association of correct signs between forecasts and outturn is not by accident. The χ^2-test statistic should be lower than 0.05 in order to reject at the customary 5 % significance level the null hypothesis of independence. It corresponds to achieving a success rate of about 80 %.

Table 12: Contingency table of directional accuracy –year ahead

Key assumptions

	Short interest rates			Long interest rates			USD against DEM, EUR after 1999	Brent crude
	D[1]	EU	US	D	EU	US		USD/barrel
ΔF≥0 and ΔR<0	3	2	4	4	2	4	5	9
ΔF<0 and ΔR≥0	2	4	1	1	2	2	3	1
ΔF<0 and ΔR<0	6	8	6	7	9	1	9	5
ΔF≥0 and ΔR≥0	6	3	6	5	4	1	5	12
Success rate	0.71	0.65	0.71	0.71	0.76	0.25	0.64	0.63
Signif indep	0.09	0.31	0.06	0.06	0.05	0.19	0.22	0.08

Other assumptions

Short-term interest rates, % p.a. (BEF = LUF)

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
ΔF≥0 and ΔR<0	2	1	1	0	1	0	0	2	1	0	1
ΔF<0 and ΔR≥0	2	3	6	3	4	4	2	2	3	1	3
ΔF<0 and ΔR<0	8	10	7	7	7	8	11	8	7	9	8
ΔF≥0 and ΔR≥0	2	3	2	1	2	2	1	2	3	1	5
Success rate	0.71	0.76	0.56	0.73	0.64	0.71	0.86	0.71	0.71	0.91	0.76
Signif indep	0.26	0.06	0.52	0.17	0.35	0.08	0.05	0.26	0.12	0.03	0.03

Long-term interest rates, % p.a

	B	DK	EL	E	F	IRL	I	L	NL	P	UK
ΔF≥0 and ΔR<0	4	3	1	3	4	3	2	5	5	1	3
ΔF<0 and ΔR≥0	3	1	3	3	5	3	1	2	2	3	3
ΔF<0 and ΔR<0	7	11	4	6	6	8	9	7	5	8	8
ΔF≥0 and ΔR≥0	3	2	4	2	2	3	5	3	5	2	3
Success rate	0.59	0.76	0.67	0.57	0.47	0.65	0.82	0.59	0.59	0.71	0.65
Signif indep	0.59	0.12	0.20	0.80	0.63	0.35	0.01	0.49	0.38	0.21	0.35

Exchange rates[2], annual % change against DEM, EUR after 1999 (BEF = LUF)

	BEF	DKK	GRD	ESP	FRF	IEP	ITL	LUF	NLG	PTE	GBP
ΔF≥0 and ΔR<0	4	2	3	1	4	4	2	4	5	1	4
ΔF<0 and ΔR≥0	3	1	0	3	1	3	2	3	4	1	2
ΔF<0 and ΔR<0	3	5	0	3	4	2	1	3	5	3	5
ΔF≥0 and ΔR≥0	10	14	16	6	11	11	15	10	6	8	11
Success rate	0.65	0.86	0.84	0.69	0.75	0.65	0.80	0.65	0.55	0.85	0.73
Signif indep	0.36	0.00	na	0.16	0.04	0.57	0.33	0.36	0.65	0.02	0.05

[1] D = euro area from 1999

For each variable the first two rows indicate the number of failures, the next two rows the number of successes. The success rate is the percentage share of successes. Signif indep is the significance level of the χ^2-statistic for independence of forecasts and realisations. With numbers below 0.05 the null hypothesis of independence can be rejected at the 5 % significance level.

The success rate for assumptions concerning such volatile variables as the key short and long rates in the EU, the US dollar exchange rate and oil prices interest rate is very reassuring for the current year. Close to 80 % or more of the changes were correctly predicted. Directional accuracy declines in the year ahead as the forecast horizon lengthens. The success rate is generally around 65-70 %; the particularly low success rate for US long rates is not very telling due to lack of observations. Out of 22 observations, a strengthening of the German mark or euro was erroneously assumed five times. The typical mistake for oil prices (9 out of 27) was assuming an increase for the next year which turned out to be a decline (see table 12).

Directional accuracy is very satisfactory for the other assumptions in the current year. Only Italian short rates and Greek long rates fail the test. The success rate drops in the year is ahead, but remains above 50 %. Only predicting the direction of change in French long-term interest rates has a success rate below 50 %.

XII. The main characteristics of prediction mistakes in the international environment

An extensive analysis of the error characteristics of the variables shaping the international economic environment is made in Keereman (1999) covering the period 1969-1997. In the context of this study, only the key numbers are recalled, but the data have been updated until 2001.

Errors in US GDP, world trade growth, EU trade volumes and prices are large. However, they display in general the desirable characteristics of absence of bias, absence of error persistence and efficiency. Furthermore, the Commission forecasting approach outperforms naïve alternative methods based on a trend or a no change forecast. Also with respect to directional accuracy, the result is good; in 90 % (for the current year) to 70 % (for the year ahead) the forecast of acceleration or deceleration is correct.

1. US GDP and world trade growth

Errors in US GDP and world trade growth are in general larger than those observed in variables with the same dimension, e.g. GDP growth. The mean absolute error in predicting US GDP growth is 0.80 for the whole sample with a negligible improvement in the later part of the period. In the year ahead the error remains about 1.3 %. There is a tendency to underestimate US GDP growth, but it is not significant in a statistical sense.

International trade flows can be very volatile from one year to another and are in consequence difficult to predict. This is reflected in the large mean absolute forecast error of more than 2 % and it increases to close to 3 % in the year ahead if the whole period is taken into consideration, but some improvement is noticed more recently. The average error is in some cases also large, but not significantly different from zero.

Table 13: Basic forecast error characteristics of US GDP and world trade

	US GDP growth		World import volume growth	
	Current year	Year ahead	Current year	Year ahead
Sample	74/01	75/01	74/01	75/01
MAE	0.80	1.29	2.29	2.91
ME	-0.20	-0.30	-0.04	0.32
Signif ME=0	0.32	0.33	0.95	0.69
Sample	83/01	84/01	83/01	83/01
MAE	0.74	1.31	2.04	2.69
ME	-0.32	-0.57	-0.60	-0.29
Signif ME=0	0.10	0.11	0.34	0.74

ME (mean forecast error): coefficient in the regression e = ME + μ where e is the forecast error.
Signif ME=0: the significance level of the t-statistic for ME=0. Numbers above 0.05 indicate absence of bias at the 5 % significance level.

2. Export volumes and import prices

Compared to GDP growth and inflation, errors in export volumes and import prices are large, which can be explained by the higher volatility of the underlying series. The mean absolute error in forecasting export volumes for the EU in the current year is about 2 % over the whole sample and there is hardly an improvement since the mid-eighties. At the country level, a small reduction in the mistake is noticeable, but not in Germany, Ireland and the UK. There does appear to be a bias except in Irish exports which seem to be systematically underestimated.

Table 14: Basic characteristics of the export volume and import price forecast error - current year

	B	DK	D	EL	E	F	IRL	I	L	NL	P	UK	EU
Export volumes													
Sample	69/01	73/01	69/01	81/01		69/01	73/01	69/01	69/01	69/01		73/01	69/01
MAE	2.65	2.74	3.31	4.84		2.51	3.97	3.06	3.10	2.42		2.07	2.01
ME	0.06	0.23	-0.36	-0.60		-0.37	-2.17	0.57	0.46	-0.53		0.31	-0.12
Signif ME=0	0.92	0.71	0.65	0.68		0.55	0.01	0.38	0.49	0.37		0.54	0.80
Sample	83/01	83/01	83/01	83/01	86/01	83/01	83/01	83/01	83/01	83/01	86/01	83/01	83/01
MAE	2.17	2.54	3.48	4.64	4.06	2.22	4.07	2.66	2.67	1.73	3.31	2.28	1.96
ME	-0.01	-0.19	-0.25	-1.37	-1.46	-0.76	-2.63	-0.15	-0.64	-0.72	-1.11	-0.10	-0.32
Signif ME=0	0.99	0.80	0.83	0.36	0.23	0.32	0.01	0.85	0.43	0.23	0.33	0.88	0.59
Import prices													
Sample	69/01	73/01	69/01	81/01		69/01	73/01	69/01	70/01	69/01		73/01	69/01
MAE	2.76	2.39	1.74	2.93		2.75	2.97	3.82	2.36	2.09		3.51	2.20
ME	-1.59	-0.63	0.34	0.00		-0.97	-1.32	-1.59	-0.56	-0.21		-0.09	-0.58
Signif ME=0	0.06	0.35	0.42	1.00		0.25	0.22	0.19	0.33	0.66		0.92	0.40
Sample	83/01	83/01	83/01	83/01	86/01	83/01	83/01	83/01	83/01	83/01	86/01	83/01	83/01
MAE	1.96	1.52	1.22	2.31	1.69	1.86	2.02	2.37	1.77	1.83	2.12	2.81	1.56
ME	-0.39	0.28	0.33	0.93	0.23	0.51	-0.07	-0.13	0.31	0.56	1.18	0.78	0.32
Signif ME=0	0.51	0.51	0.40	0.22	0.70	0.38	0.91	0.86	0.51	0.31	0.04	0.30	0.50

ME (mean forecast error): coefficient in the regression $e = ME + \mu$ where e is the forecast error.
Signif ME=0: the significance level of the t-statistic for ME=0. Numbers above 0.05 indicate absence of bias at the 5 % significance level.

Table 15: Basic characteristics of the export volume and import price forecast error - year ahead

	B	DK	D	EL	E	F	IRL	I	L	NL	P	UK	EU
Export volumes													
Sample	70/01	74/01	70/01	82/01		70/01	74/01	70/01	70/01	70/01		74/01	70/01
MAE	3.04	3.43	4.16	5.78		3.21	5.53	4.02	5.05	3.39		2.29	2.80
ME	0.65	0.36	-0.44	-0.13		0.06	-2.30	0.69	0.55	0.06		0.49	0.01
Signif ME=0	0.41	0.63	0.66	0.93		0.94	0.06	0.42	0.62	0.94		0.43	0.99
Sample	84/01	84/01	84/01	84/01	87/01	84/01	84/01	84/01	84/01	84/01	87/01	84/01	84/01
MAE	2.72	3.23	3.71	4.98	4.73	2.91	5.91	3.41	4.99	2.24	5.17	2.41	2.59
ME	-0.01	0.02	-0.34	0.09	-2.31	-0.27	-3.83	0.49	-1.40	-0.02	0.11	-0.14	-0.27
Signif ME=0	0.99	0.99	0.77	0.95	0.12	0.78	0.01	0.64	0.35	0.98	0.95	0.86	0.74
Import prices													
Sample	70/01	74/01	70/01	82/01		70/01	74/01	70/01	70/01	70/01		74/01	70/01
MAE	4.65	4.80	4.02	3.55		5.08	4.78	7.77	4.23	4.32		4.60	4.41
ME	-0.45	-0.56	0.39	0.99		-0.15	-1.64	-3.25	0.41	0.15		0.19	-0.72
Signif ME=0	0.71	0.71	0.72	0.34		0.92	0.30	0.15	0.70	0.89		0.90	0.59
Sample	84/01	84/01	84/01	84/01	87/01	84/01	84/01	84/01	84/01	84/01	87/01	84/01	84/01
MAE	3.78	2.71	3.21	3.43	2.81	3.57	3.41	4.53	3.63	3.42	2.72	3.42	2.79
ME	1.49	1.51	1.80	1.62	1.00	2.24	0.69	1.14	3.06	2.22	1.44	2.03	1.55
Signif ME=0	0.20	0.06	0.07	0.12	0.27	0.04	0.55	0.47	0.00	0.03	0.13	0.02	0.09

ME (mean forecast error): coefficient in the regression $e = ME + \mu$ where e is the forecast error.
Signif ME=0: the significance level of the t-statistic for ME=0. Numbers above 0.05 indicate absence of bias at the 5 % significance level.

EU import prices display a mean absolute forecast error of 2.20 % over the whole sample period with a substantial improvement to about 1.56 % in the more recent sub-sample. A similar improvement can be observed at the Member State level. No strong evidence of systematic

over- or underestimation is found, except in Portugal where import prices were forecast to increase too fast. However, there appears to be a tendency to move from underestimation of import prices to overestimation since the mid-eighties.

Compared to the current year, errors in the year ahead are larger due to lack of information. In particular, the import price forecast mistakes are big. For the EU, the error amounts to 4.41 % calculated over the entire sample; a reduction of the error is observed in the more recent sub-period.

With respect to export prices, Ireland remains the country where there is evidence of significant underestimation. Concerning import prices, the tendency to move from underestimation in the beginning of the sample to overestimation since the mid-eighties is accentuated. The overestimation of import prices is significant in four countries (France, Luxembourg, Netherlands and United Kingdom).

XIII. The main characteristics of prediction mistakes in EU GDP and inflation

Before analysing the role of external assumptions and the international economic environment in explaining the forecast error made in two key variables, GDP growth and inflation, the main characteristics of the prediction errors in these variables are recalled based on a sample updated until 2001 (for an extensive analysis see Keereman, 1999).

Table 16: Basic characteristics of the GDP and inflation forecast error - current year

	B	DK	D	EL	E	F	IRL	I	L	NL	P	UK	EU
GDP													
Sample	69/01	73/01	69/01	81/01		69/01	73/01	69/01	69/01	69/01		73/01	69/01
MAE	0.72	0.78	0.98	0.90		0.55	1.66	0.89	1.45	0.72		0.74	0.51
ME	-0.08	0.04	0.00	-0.24		0.00	-0.58	0.40	-0.69	-0.08		-0.03	0.09
Signif ME=0	0.60	0.85	1.00	0.39		0.98	0.12	0.07	0.04	0.62		0.88	0.50
Sample	83/01	83/01	83/01	83/01	86/01	83/01	83/01	83/01	83/01	83/01	86/01	83/01	83/01
MAE	0.67	0.77	0.83	0.84	0.61	0.53	1.85	0.49	1.41	0.73	0.64	0.59	0.41
ME	-0.15	-0.22	-0.32	-0.41	-0.19	-0.14	-1.05	0.24	-1.13	-0.32	0.09	-0.06	-0.08
Signif ME=0	0.47	0.35	0.20	0.14	0.37	0.36	0.03	0.08	0.01	0.14	0.68	0.73	0.56
Inflation													
Sample	69/01	73/01	69/01	81/01		69/01	73/01	69/01	69/01	69/01		73/01	69/01
MAE	0.58	0.60	0.32	0.97		0.46	1.04	0.70	0.55	0.42		0.80	0.35
ME	0.04	-0.26	0.09	-0.02		-0.01	0.03	-0.13	0.07	-0.02		0.15	0.02
Signif ME=0	0.74	0.07	0.21	0.95		0.94	0.91	0.46	0.59	0.81		0.54	0.77
Sample	83/01	83/01	83/01	83/01	86/01	83/01	83/01	83/01	83/01	83/01	86/01	83/01	83/01
MAE	0.32	0.42	0.25	0.90	0.44	0.27	0.61	0.40	0.47	0.28	0.61	0.49	0.17
ME	-0.03	-0.24	0.13	-0.15	-0.26	0.07	0.17	-0.27	0.13	-0.01	-0.42	0.14	-0.01
Signif ME=0	0.80	0.05	0.06	0.62	0.08	0.40	0.36	0.00	0.31	0.90	0.03	0.36	0.92

ME (mean forecast error): coefficient in the regression $e = ME + \mu$ where e is the forecast error.
Signif ME=0: the significance level of the t-statistic for ME=0. Numbers above 0.05 indicate absence of bias at the 5 % significance level.

Adding 4 more observations (1998-2001) does not change fundamentally the long-term characteristics of the forecast errors. With respect to the EU, the mean absolute error calculated over the last 30 years is 0.5 % for the GDP growth forecast made in the current year and 0.4 % for inflation. In the year ahead forecast these numbers roughly double to 0.9 %. Due to the smoothing effect of aggregation, prediction errors for the EU are in general smaller than for individual Member States. Mistakes are larger for the small open economies. In the current year the mean absolute error for GDP forecasts ranges from 0.6 % (France) to 1.7 % (Ireland); inflation errors range from 0.3 % (Germany) to 1 % (Ireland). In the year ahead, particularly large errors were made in predicting Irish and Luxembourg growth; inflation was badly forecast in Ireland and two of the larger economies (Italy and United Kingdom).

Table 17: Basic characteristics of the GDP and inflation forecast error - year ahead

	B	DK	D	EL	E	F	IRL	I	L	NL	P	UK	EU
GDP													
Sample	70/01	74/01	70/01	82/01		70/01	74/01	70/01	70/01	70/01		74/01	70/01
MAE	1.17	0.99	1.27	0.96		0.88	2.42	1.29	2.10	1.09		1.18	0.89
ME	0.22	0.16	0.37	-0.06		0.27	-0.76	0.63	-0.02	-0.06		0.28	0.32
Signif ME=0	0.45	0.51	0.22	0.86		0.22	0.15	0.04	0.97	0.80		0.32	0.16
Sample	84/01	84/01	84/01	84/01	87/01	84/01	84/01	84/01	84/01	84/01	87/01	84/01	84/01
MAE	1.06	0.91	0.97	0.87	0.95	0.81	2.49	0.74	2.14	0.92	0.83	1.01	0.66
ME	-0.16	0.07	0.10	-0.27	-0.12	0.12	-1.86	0.34	-0.84	-0.42	0.16	0.12	0.08
Signif ME=0	0.61	0.83	0.72	0.38	0.71	0.62	0.00	0.13	0.19	0.13	0.57	0.69	0.69
Inflation													
Sample	70/01	74/01	70/01	82/01		70/01	74/01	70/01	70/01	70/01		74/01	70/01
MAE	1.08	1.26	0.75	1.35		1.03	1.89	1.54	1.37	0.72		1.62	0.91
ME	0.08	-0.43	-0.02	-0.77		-0.35	-0.38	-1.21	-0.14	0.18		-0.24	-0.25
Signif ME=0	0.78	0.27	0.93	0.11		0.22	0.49	0.01	0.64	0.28		0.62	0.33
Sample	84/01	84/01	84/01	84/01	87/01	84/01	84/01	84/01	84/01	84/01	87/01	84/01	84/01
MAE	0.70	0.74	0.51	1.34	0.55	0.46	0.91	0.67	1.01	0.54	1.21	0.85	0.38
ME	0.41	-0.18	0.37	-1.02	-0.36	0.23	0.46	-0.48	0.49	0.17	-0.95	0.12	0.04
Signif ME=0	0.04	0.41	0.02	0.04	0.07	0.08	0.09	0.03	0.09	0.29	0.05	0.67	0.71

ME (mean forecast error): coefficient in the regression $e = ME + \mu$ where e is the forecast error.
Signif ME=0: the significance level of the t-statistic for ME=0. Numbers above 0.05 indicate absence of bias at the 5 % significance level.

Still looking at the 30-year period, there is in general no evidence of a significant bias in forecasting GDP and inflation, but in the case of Italy, GDP is in a systematic way overestimated and inflation underestimated in the year ahead. There is also a significant underestimation of current year Luxembourg growth.

Some of the external assumptions started to play a prominent role in the Commission forecasts only in the early eighties (see table 1 and 2), while predictions for most of the macroeconomic variables have been available since 1969/70. In view of this, the basic features of the GDP and inflation forecast errors have been recalculated over the period corresponding to the data availability of the external assumptions. This allows also one to verify whether forecast accuracy improved.

In general forecast errors declined in the second sub-period, most notably for inflation where the mean absolute error for the EU halved. The mean absolute error in forecasting EU GDP in the current year dropped slightly to 0.4 % and to 0.7 % in the year ahead. The mean absolute error for EU inflation is only 0.2 % in the current year and 0.4 % in the year ahead. Contrary to the general improvement, the mean absolute errors for Ireland and Luxembourg moved in the wrong direction.

For the EU as a whole there is no evidence of the presence of overly optimistic forecasts (overestimation of growth, underestimation of inflation) in the second sub-period. For GDP, the contrary appears to be case with a tendency to underestimate growth, certainly in the current year. Underestimation is significant for Ireland and Luxembourg. With respect to inflation, the results are more mixed at the country level. There is evidence of significant underestimation in Greece, Italy and Portugal and also in Denmark and Spain there is an tendency to give a too rosy picture of price developments. In the other Member States, inflation appears mostly overestimated and in Belgium and Germany this happens in a systematic way.

XIV. The impact of errors of the external environment

Simple regression analysis is used to examine to what extent forecasting errors in GDP and inflation can be attributed to wrong external assumptions or a wrong assessment of the international economic environment. Attention is also paid to export volumes and import prices

which are the output of the trade consistency model and are the link between the external assumptions and international economic environment, on the one hand, and inflation and GDP, on the other hand.

"What do the right hand side variables of the equation explain ?", is the question which is tried to be answered. If the purpose would have been to give a more complete explanation of the errors made, the presumption is, e.g. in the case of the Belgian GDP forecast error, that the use of the GDP forecast error in the neighbouring countries instead of US GDP would have resulted in a better fit. In the latter approach, the fit of the regression is likely to improve.

1. GDP

Table 18: External assumptions and forecast errors in GDP

	B	DK	D	EL	E	F	IRL	I	L	NL	P	UK	EU
Current year													
Constant	0.05	-0.12	-0.25	-0.58	-0.07	0.04	-0.79	0.21	-0.73	-0.01	0.26	0.04	-0.10
Signif	0.83	0.62	0.40	0.06	0.75	0.80	0.14	0.18	0.10	0.97	0.34	0.83	0.35
US GDP	0.43	0.57	0.42	0.71	0.28	0.42	0.65	0.21	1.26	0.49	0.23	0.46	0.26
Signif	0.10	0.04	0.20	0.04	0.21	0.01	0.26	0.19	0.02	0.03	0.41	0.04	0.04
LT interest rate	0.35	0.40	0.20	-0.12	0.52	0.47	-0.64	0.17	-0.37	0.83	-0.06	0.18	0.69
Signif	0.41	0.19	0.75	0.15	0.02	0.02	0.31	0.24	0.66	0.02	0.68	0.60	0.00
Oil price	0.01	-0.02	-0.01	-0.04	0.00	-0.01	0.01	-0.01	0.00	0.00	0.01	-0.01	-0.01
Signif	0.64	0.11	0.54	0.02	0.82	0.48	0.84	0.25	0.95	0.90	0.46	0.55	0.06
R^2	0.27	0.38	0.14	0.60	0.48	0.51	0.14	0.22	0.32	0.49	0.11	0.32	0.63
DW	1.15	2.68	2.16	2.16	1.46	1.14	1.85	2.43	0.95	0.86	0.83	2.60	1.76
Year ahead													
Constant	-0.04	0.21	0.10	-0.06	0.00	0.29	-1.41	0.47	-0.16	-0.18	0.32	0.36	0.20
Signif	0.88	0.55	0.70	0.86	1.00	0.14	0.01	0.03	0.74	0.24	0.27	0.26	0.18
US GDP	0.44	0.24	0.22	0.42	0.33	0.43	0.75	0.30	1.38	0.59	0.34	0.43	0.34
Signif	0.02	0.31	0.22	0.05	0.14	0.00	0.04	0.04	0.00	0.00	0.11	0.05	0.00
LT interest rate	1.03	0.16	1.04	0.01	0.32	0.52	-0.35	0.45	0.62	1.01	0.20	0.06	0.62
Signif	0.02	0.59	0.01	0.96	0.19	0.03	0.49	0.03	0.34	0.00	0.43	0.89	0.01
Oil price	-0.02	-0.01	-0.02	-0.02	-0.01	-0.01	0.03	-0.01	-0.01	-0.01	0.01	0.00	-0.01
Signif	0.21	0.52	0.11	0.07	0.74	0.11	0.19	0.09	0.58	0.03	0.49	0.80	0.05
R^2	0.54	0.11	0.44	0.45	0.32	0.61	0.35	0.45	0.64	0.80	0.30	0.26	0.68
DW	1.67	1.29	2.10	2.03	1.56	1.63	1.37	1.42	2.53	2.13	1.25	1.30	2.37

Signif: the significance level of the t-statistic. Numbers below 0.05 indicate significant variables at the 5 % level.

The GDP prediction mistake is related to forecasting errors in US growth, errors in the monetary assumptions and errors in setting oil prices.

A positive sign is expected between US growth errors and prediction mistakes in EU growth, while a negative sign is expected for wrong oil price assumptions. It is intuitively clear that an overestimation of US growth leads to an overestimation of growth in the EU, while an overestimation of oil prices should have an underestimation of GDP growth as a consequence. A priori one would expect a negative sign between the monetary conditions and growth, because a rise in the interest rate or an appreciation of the exchange rate dampens economic activity. In order to represent best the monetary conditions, several variables were tried out: short-term interest rates, long-term interest rates, yield spread, exchange rates and monetary conditions index. Only long-term interest were used in order to limit the problem of multicollinearity and they produced overall the best results, although the sign is not as expected.

In table 18 the results are presented. At the EU level, 63 % of the GDP forecast error in the current year is explained by the external environment as suggested by the R^2-coefficient. The coefficients for the prediction error in US GDP growth and in the oil price have the correct sign and the former is even significant at the 5 % level. Also the long-term interest coefficient is significant, but has at first sight the wrong sign. Nevertheless, to the extent that a rise in interest

rates is seen as a signal that growth is likely to be strong rather than as a tightening of monetary policy (leading to lower growth), a positive relation between overestimation of interest rates and overestimation of growth can be rationalised. In a yield curve framework this can even be linked to monetary policy. A rise in the long-term interest rate makes the yield curve steeper, which is usually interpreted as an easing of monetary policy. If monetary policy is set too loose (the yield curve becomes steeper), growth is likely to be overestimated.

At the Member State level, in general, less than 50 % of the forecast error is explained by the external assumptions (the R^2-coefficient is less than 0.50), but the apparent lower importance has to put in perspective. For several Member States the forecast errors in US GDP have a significant impact and the coefficient is mostly larger than the one observed at the EU level. However, at the country level the GDP forecast error (see table 18) is usually larger diluting the role of the external environment, as defined here (external environment outside the EU). The size of the forecast error unexplained by the regression is likely to be reduced by including in the equation the mistakes made in predicting GDP in neighbouring countries. On the other hand, forecast errors in monetary conditions and oil prices do not play such an important role as at the EU level. Only in a few Member States do they contribute in a significant way to the explanation of the current year forecast errors.

Compared to the current year, a larger share of the GDP forecast errors in the year ahead is accounted for by the external environment, as less hard information is available. At the EU level, they explain 68 % of the forecast error. In 8 of the 12 examined Member States, the share of the mistake explained by the external environment increased. External assumptions and international economic conditions account for between 11 % and 80 % of the prediction mistake. In particular, the US GDP forecast errors increased in importance. At the country level, oil price assumptions have more the expected sign, but their significance remains low.

2. Inflation

With respect to inflation, the link to external assumptions and international economic environment is made via import prices which in an open economy could be an important determinant of inflation. The current year inflation forecast error is, however, only to a small extent explained by mistakes in import prices (see table 19): the R^2-coefficient is small and only in a few Member States import prices forecast errors have a significant impact (Belgium, Denmark, Spain, Ireland, Italy). At the EU level, clearly other factors explain the current year inflation errors.

Table 19: Import prices and forecast errors in inflation

	B	DK	D	EL	E	F	IRL	I	L	NL	P	UK	EU
Current year													
Constant	0.15	-0.19	0.11	-0.02	-0.29	-0.01	0.20	-0.04	0.07	-0.03	-0.60	0.16	0.02
Signif	0.23	0.12	0.13	0.95	0.03	0.95	0.41	0.80	0.59	0.79	0.01	0.51	0.79
Import prices	0.07	0.11	-0.06	-0.03	0.14	0.00	0.13	0.05	0.02	-0.01	0.16	0.08	0.00
Signif	0.01	0.00	0.08	0.66	0.02	0.98	0.00	0.03	0.62	0.76	0.07	0.10	0.94
R^2	0.19	0.30	0.10	0.01	0.34	0.00	0.26	0.14	0.01	0.00	0.22	0.10	0.00
DW	2.39	1.92	1.86	1.80	2.06	2.18	2.50	1.81	1.82	2.19	1.42	2.26	1.73
Year ahead													
Constant	0.17	-0.32	-0.05	-0.62	-0.38	-0.32	0.05	-0.71	-0.20	0.18	-1.81	-0.28	-0.14
Signif	0.40	0.19	0.74	0.18	0.08	0.06	0.88	0.01	0.49	0.28	0.01	0.43	0.38
Import prices	0.18	0.21	0.08	-0.15	0.02	0.15	0.27	0.15	0.13	0.05	0.37	0.22	0.15
Signif	0.00	0.00	0.00	0.16	0.75	0.00	0.00	0.00	0.01	0.05	0.02	0.00	0.00
R^2	0.57	0.63	0.28	0.11	0.01	0.66	0.58	0.67	0.20	0.12	0.43	0.45	0.65
DW	1.52	1.73	1.16	1.53	1.60	1.75	1.70	1.57	1.11	1.40	0.77	1.77	1.20

Signif: the significance level of the t-statistic. Numbers below 0.05 indicate significant variables at the 5 % level.

Import price errors become more important in the year ahead. They explain 65 % of the EU inflation forecast error and the coefficient is highly significant. Also in 10 of the 12 examined Member States, import price errors are a significant factor in explaining the year ahead inflation mistakes. In France and Italy, the share of the prediction mistake explained by import prices is at about the same level as the one of the EU.

3. Export volumes

Exchange rates and world imports can be expected to influence exports as they reflect international competitiveness and external demand developments. An overestimation of world trade as captured by total imports in volumes should lead to an overestimation of exports, while an overvaluation of the strength of the currency should have an underestimation of exports as a consequence. At the EU level 71 % of the export forecast error in the current year is explained by exchange rates and international trade mistakes, where the latter is the only significant variable. Similar results are obtained for Member States. The overall share of the export errors that can be attributed to exchange rates and world trade is, however, smaller for two reasons. First, the export errors at the country level are likely to be larger than at the EU level. Second, large intra-EU trade makes errors in Member States exports more sensitive to a wrong assessment of trade developments in neighbouring countries.

Exchange rate errors do in general not matter for exports forecasts. An important reason for this is likely to be the way in which the exchange rate is determined in the forecasting exercise. It is a technical hypothesis, which may not be considered realistic and hence less attention is paid to it. A second reason is the uncertain impact of exchange rate changes on exports. Depending on market structure an exchange rate change may not be translated into a price change so that the impact on exports is limited.

In the year ahead, the correctness of the exchange rates seems to play a bigger role for obtaining good export forecasts at the EU level, but an appropriate assessment of world trade developments remain the determining factor. Somewhat surprisingly, the overall explanatory power of external assumptions for export errors declines in the year ahead. The amount of information decreases with the length of the forecast horizon, so that one would have expected greater reliance on external assumptions.

Table 20: External assumptions and forecast errors in export volumes

	B	DK	D	EL	E	F	IRL	I	L	NL	P	UK	EU
Current year													
Constant	0.08	-0.21	0.11	0.59	-1.08	-0.12	-1.96	0.47	0.65	-0.45	-0.95	0.10	0.12
Signif	0.83	0.69	0.90	0.62	0.43	0.79	0.02	0.48	0.40	0.33	0.49	0.83	0.68
Exchange rate	-0.57	0.43	-0.25	-1.39	0.41	-0.89	-0.45	0.43	-0.68	0.96	-1.01	0.03	-0.03
Signif	0.27	0.36	0.19	0.01	0.43	0.16	0.36	0.17	0.53	0.32	0.31	0.80	0.59
World imports	0.92	0.72	0.74	1.37	0.63	1.14	1.12	1.00	1.21	0.77	1.30	0.56	0.83
Signif	0.00	0.00	0.04	0.02	0.11	0.00	0.01	0.01	0.01	0.00	0.11	0.01	0.00
R^2	0.53	0.37	0.21	0.43	0.11	0.55	0.23	0.34	0.28	0.43	0.13	0.27	0.71
DW	1.47	1.53	2.59	2.06	2.15	2.43	1.85	1.97	1.46	2.88	2.28	2.07	2.65
Year ahead													
Constant	0.69	-0.27	0.06	1.70	-2.34	0.37	-1.93	1.33	0.99	0.58	0.61	-0.02	0.12
Signif	0.16	0.73	0.94	0.31	0.17	0.40	0.08	0.13	0.49	0.16	0.78	0.97	0.82
Exchange rate	0.07	-0.11	-0.23	0.78	0.04	-0.77	0.48	0.38	0.03	0.79	-0.16	0.04	-0.10
Signif	0.75	0.76	0.01	0.02	0.93	0.00	0.11	0.03	0.96	0.16	0.81	0.60	0.06
World imports	0.86	0.43	0.54	1.00	0.38	0.81	1.37	0.79	1.15	0.70	1.23	0.41	0.63
Signif	0.00	0.07	0.03	0.07	0.22	0.00	0.00	0.02	0.05	0.00	0.16	0.02	0.00
R^2	0.56	0.10	0.35	0.25	-0.02	0.74	0.39	0.33	0.15	0.59	0.04	0.18	0.50
DW	1.56	1.77	2.22	2.04	2.26	1.83	1.76	1.70	2.27	2.20	2.45	2.41	2.54

Signif: the significance level of the t-statistic. Numbers below 0.05 indicate significant variables at the 5 % level.

4. Import prices

Using an overestimated conversion factor for foreign prices should lead to an underestimation of import prices. The sign of oil price and import price errors should be the same and this is also what is observed in table 21. Only in the current there are a few exceptions. The exchange rate, however, most often does not have the expected sign. In the current year, exchange rates and oil prices do not play a major role in explaining import price forecast errors. Only 33 % of the error in EU import prices is explained by them.

In the year ahead, external assumptions are more important. At the EU level, 62 % of the import price forecast error can be attributed to exchange rates and oil prices. Both of them appear highly significant, similarly at the country level. Especially, the oil prices error became more significant.

Table 21: External assumptions and forecast errors in import prices

	B	DK	D	EL	E	F	IRL	I	L	NL	P	UK	EU
Current year													
Constant	-0.25	-0.10	0.78	-0.28	0.50	0.18	-0.23	0.61	0.72	0.74	1.74	0.91	0.56
Signif	0.69	0.87	0.09	0.79	0.39	0.80	0.76	0.43	0.26	0.22	0.00	0.22	0.23
Exchange rate	0.41	0.94	-0.19	0.98	-0.17	0.22	0.09	-0.18	1.65	2.34	-0.48	0.33	-0.24
Signif	0.62	0.05	0.04	0.04	0.47	0.81	0.83	0.58	0.05	0.05	0.24	0.07	0.01
Oil price	0.05	0.03	0.04	0.00	-0.02	0.04	-0.04	0.11	0.02	0.08	-0.01	0.01	0.04
Signif	0.36	0.51	0.16	0.96	0.44	0.54	0.59	0.08	0.72	0.12	0.78	0.89	0.18
R^2	0.06	0.20	0.27	0.24	0.08	0.03	0.03	0.18	0.20	0.34	0.14	0.16	0.33
DW	1.03	1.68	2.19	0.89	2.24	1.38	1.49	2.53	1.63	1.31	2.00	2.30	1.98
Year ahead													
Constant	1.08	0.83	1.82	1.40	1.52	1.43	0.34	1.11	2.66	1.66	2.25	1.80	1.31
Signif	0.29	0.32	0.00	0.23	0.07	0.17	0.77	0.44	0.00	0.09	0.03	0.02	0.03
Exchange rate	0.61	0.69	-0.30	0.23	0.08	-0.36	-0.04	0.55	0.99	0.37	0.38	0.29	-0.23
Signif	0.18	0.08	0.00	0.30	0.72	0.48	0.90	0.07	0.01	0.77	0.21	0.01	0.00
Oil price	0.09	0.08	0.07	0.08	0.02	0.10	0.04	0.14	0.03	0.09	0.06	0.08	0.09
Signif	0.05	0.02	0.00	0.09	0.32	0.02	0.38	0.03	0.43	0.03	0.16	0.02	0.00
R^2	0.24	0.37	0.72	0.17	0.11	0.32	0.05	0.37	0.33	0.26	0.35	0.38	0.62
DW	1.38	1.69	2.01	1.48	1.32	1.67	1.91	1.92	1.55	1.55	1.51	2.20	1.78

Signif: the significance level of the t-statistic. Numbers below 0.05 indicate significant variables at the 5 % level.

XV. The anatomy of a few big forecast errors

Occasionally, big forecast errors are made. Some of these will be highlighted and the question is asked whether a larger than average proportion of the mistake can be accounted for by the external assumptions and the international environment.

1. Real GDP growth

In 2001, EU GDP growth was overestimated by 1.1 % point in the Spring Forecasts of the same year (current year forecast) and by 1.6 % point in the Autumn Forecast of the preceding year (year ahead forecast). These errors are larger than usual. The mean absolute forecast error (calculated over the last 20 years) is 0.4 % in the current year and 0.7 % in the year ahead (see table 16 and 17). One has to go back as far as 1982 and 1974/75 to observe similar mistakes (see figure 10). Especially in 1975, the year ahead forecast error was particularly large: in Autumn 1974 a growth rate of 2.5 % was forecast, while it turned out to be a contraction of 2.3 % (based on realisation data from Autumn 1976[2]).

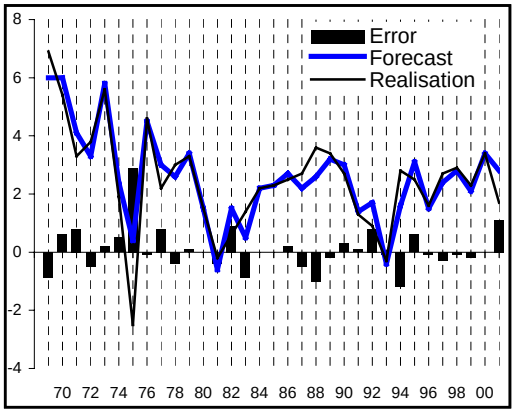
[2] Note that, based on revised (Spring 2003) national accounts data, the GDP contraction in the 9 countries which formed the EU at that moment is only 0.9 %.

Sometimes, the dynamism of the economy has been grossly underestimated. This occurred in 1994 when the strength and the speed of the recovery following on the recession in the previous year was underestimated and it happened also in 1976 (only with respect to the year ahead forecast). Following the recession in the beginning of the eighties, the pick-up appeared to be rather overestimated (see figure 10). Another large underestimation occurred in 1988, when the duration of the expansion was set too short. The underestimation at the EU level was about 1 to 1.5 % points.

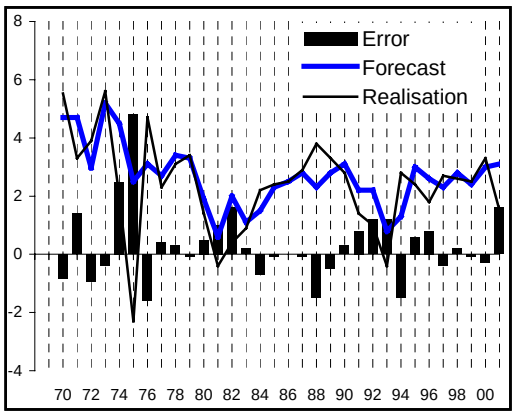
Especially in the smaller Member States large forecast errors have been made, but Germany appears to have a big influence on the error made at the EU level, given its weight and the size of the forecast error in German GDP.

Figure 10: Real GDP growth in the EU – current year, year ahead

current year



year ahead



In what follows the focus is on the year ahead forecast error in EU growth as the role of the external assumptions and international environment in explaining the forecast mistakes is more pronounced than for the current year (see table 18).

The large overestimation which occurred in 2001 can to a large extent be attributed to a wrong assessment of the global economic context: US growth was 3 % too high (see table 22 and figure 11) and world trade was overestimated by 9.4 % (see figure 11). Forecasters were misled by the hype induced by the global technology boom and the related promises of the Lisbon European Council of March 2000 to "become the most competitive and dynamic knowledge-based economy in the world, …" by 2010. Also the setting of the monetary conditions induced errors. Long-term interest were fixed too high, compatible with strong growth, but the consequences of the unprecedented fall in stock markets were not well foreseen. For safe haven reasons, bond prices increased and long-term yield declined, while a rise in yields was assumed (see also figure 5).

When the Autumn 2000 Forecasts were made, oil prices had been on a rising trend (from a low of USD 10 per barrel in January 1999 to USD 32.5 in November 2000) and a further increase in the oil price was assumed for the following year (see figure 8). This proved to be incorrect. However, the overestimation of the oil price by 16 % points did not contribute to the forecast error. Actually it made the mistake smaller as an overestimation of the oil price leads to an underestimation of growth (reflected in the negative sign of the oil price coefficient, see table 18). This does not mean that the oil price rise did not play a role in the slowdown of the economy in 2001.

Similarly, for the other large GDP forecast error reported in table 22, the oil price forecast errors do not bear an important responsibility. Also in 1975, when the largest forecast error ever for EU GDP was made (see figure 8), the oil price forecast error was relatively small. It is a wrong

assessment of the economic impact of the "first" oil price hike which is likely to have caused the mistake. In the aftermath of the Yom Kippour war of October 1973 between Israel and its Arab neighbours, oil prices increased in January 1974 to about USD 15 per barrel from USD 5 in the previous month.

Table 22: External assumptions, international environment and some large forecast errors in EU GDP – year ahead

	Coefficient	Overestimation						Underestimation					
		2001			1993			1994			1988		
		error	contr.	share	error	contr.	share	error	contr.	share	error	contr.	share
GDP		1.6	1.56	0.97	1.2	0.7	0.62	-1.5	-1.0	0.69	-1.5	-0.7	0.47
Constant	0.20		0.20	0.13		0.2	0.17		0.2	-0.13		0.2	-0.13
US GDP	0.34	3.0	1.02	0.64	-0.6	-0.2	-0.17	-1.5	-0.5	0.34	-1.7	-0.6	0.39
LT interest rate	0.62	0.8	0.50	0.31	1.4	0.9	0.72	-1.1	-0.7	0.47	-0.2	-0.1	0.08
Oil price	-0.01	16.0	-0.16	-0.10	11.9	-0.1	-0.10	3.1	0.0	0.02	20.9	-0.2	0.14

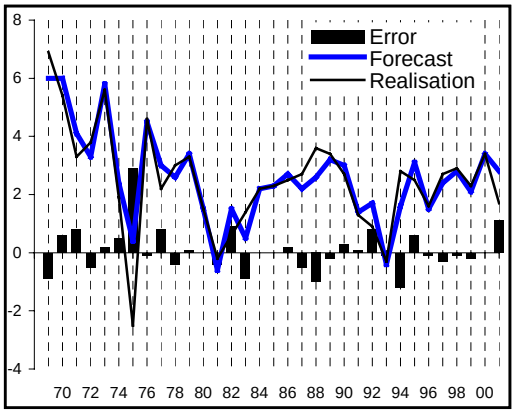
Coefficient: see table 18
error: observed forecast error (% point)
contr.: contribution to forecast error (contr. = coefficient x error)
share: % contribution to forecast error (share = contr. / GDP error)

In the beginning of the nineties, following the German re-unification boom, the economy slowed down and three consecutive years (1991 – 1993) were observed of relatively large forecast errors (0.8 to 1.2 %). The focus is on 1993 when the EU-9 economy shrank by 0.4 % (based on realisation data of Autumn 1994[3]). The failure to forecast the recession and the magnitude of the forecast error cannot be attributed to a wrong assessment of the international environment. The dynamism of the US economy, just coming out of its 1991 recession, was underestimated (see table 22) and no forecast error was made with international trade (see figure 11). However, apparently the setting of the monetary conditions induced an error. Against the background of the crisis of the Exchange Rate Mechanism, interest rates were set too high and, consequently, growth was overestimated.

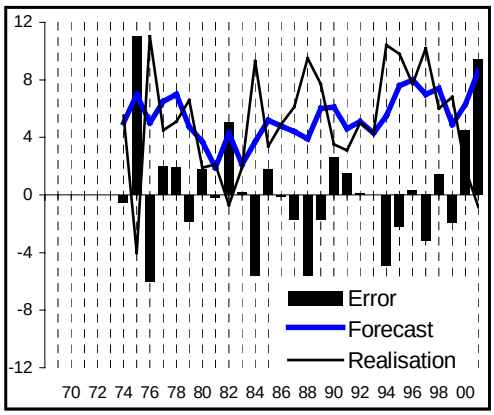
The vigorous rebound in 1994 after the recession in the previous year was clearly unforeseen and EU growth was underestimated by 1.5 %. Partially, this can be attributed to the underestimation of US growth, but in particular the wrong signal coming from the underestimation of interest rates should not be neglected.

Figure 11: International environment – year ahead

Real US GDP growth



Real world import growth



[3] Note that, based on revised (Spring 2003) national accounts data, the GDP contraction in the 12 countries which formed at that moment the EU is 0.3 %.

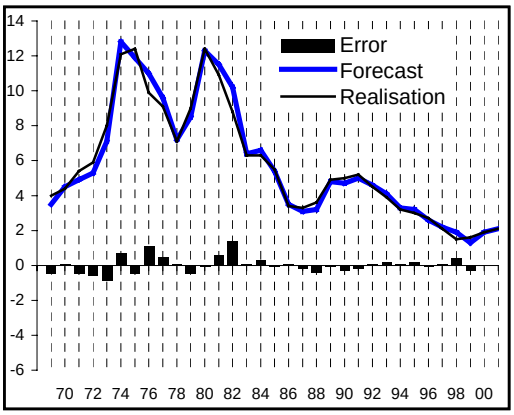
The 1988 underestimation is, compared to the other big mistakes, less well explained by the international environment. Nevertheless, the underestimation of US GDP growth and the overestimation of the oil price should not be neglected as an explanatory factor. The stock market crash of October 1987, which occurred in the middle of the preparation of the forecasts for the following year, has probably been the most important determinant of the underestimation.

2. Inflation

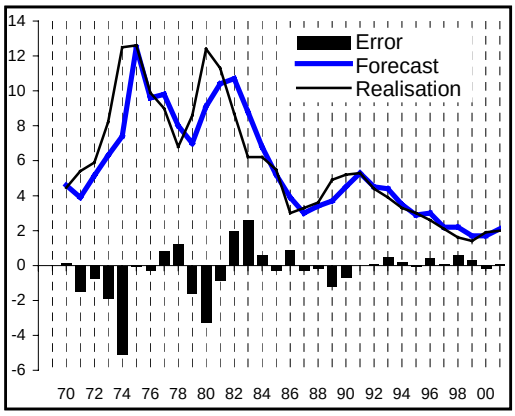
Since the disinflation process of the early eighties, inflation forecast errors have become much smaller (see figure 12). The latest large overestimation occurred in 1998; inflation was forecast 0.6 % point higher than it turned out to be. This compares, for example, to an overestimation of 2.6 % point in 1983. Nevertheless, in relative terms, taking into account the observed inflation rate (1.6 % in 1998 and 6.2 % in 1993), the size of the error is of comparable magnitude (37.5 % in 1998 and 41.9 % in 1983).

Figure 12: Inflation in the EU – current year, year ahead

current year



year ahead



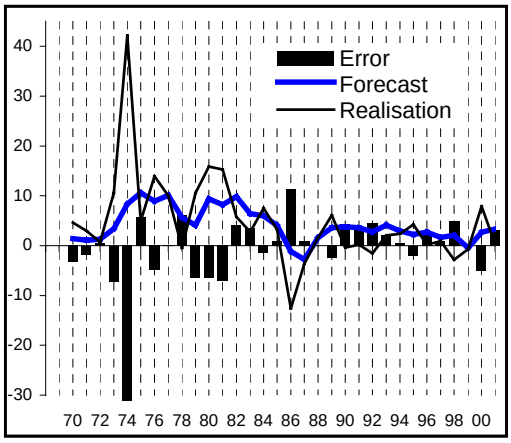


Figure 13: EU import prices – year ahead

In 1998 the oil price fell to USD 12.7 per barrel and this had not been foreseen in Autumn 1997 when the year ahead forecasts were made leading to an overestimation of USD 6.6 or 34 % points. The forecast error can entirely be attributed to import prices, in particular the oil price. However, the large errors cannot always be so well explained by import prices and external assumptions. In 1983, only 15 % of the large overestimation of 2.6 % can be attributed to wrong import prices, of which the overestimation was relatively small (see figure 13). Furthermore, the import prices themselves were poorly explained by the exchange rate and oil price assumptions (see table 23). Apparently, the weakness of the European currencies in the early eighties and continued high oil prices (about USD 34), prevented to see correctly the size of the disinflation process, for which elsewhere

there were some signs: after the recession[4] of 1981 to which the "second" oil price hike in 1979 contributed, demand pressures were low (growth was below potential).

Occasionally, inflation was largely underestimated. This last occurred in 1989, during the boom at the end of the eighties, related to German unification. The underestimation of import prices, the overestimation of the German mark and the underestimation of oil prices contributed to the 1.2 % underestimation of inflation, but more than 50 % of the inflation underestimation appears to be attributable to other factors, probably related to the overheating of the economy.

Table 23: External assumptions and some large forecast errors in EU inflation – year ahead

	Coefficient	Overestimation						Underestimation					
		1998			1983			1989			1980		
		error	contr.	share	error	contr.	share	error	contr.	share	error	contr.	share
Inflation		0.6	0.6	0.99	2.6	0.4	0.15	-1.2	-0.5	0.43	-3.3	-1.1	0.33
Constant	-0.14		-0.1	-0.23		-0.1	-0.05		-0.1	0.12		-0.1	0.04
Import price	0.15	4.9	0.7	1.23	3.6	0.5	0.21	-2.5	-0.4	0.31	-6.4	-1.0	0.29
Import price		4.9	4.8	0.99	3.6	1.0	0.28	-2.5	-0.9	0.36	-6.4	-2.5	0.39
Constant	1.31		1.3	0.27		1.3	0.36		1.3	-0.52		1.3	-0.20
Exchange rate	-0.23	-2.0	0.5	0.09	4.9	-1.1	-0.31	3.2	-0.7	0.29	2.0	-0.4	0.07
Oil price	0.09	34.0	3.1	0.62	9.2	0.8	0.23	-16.5	-1.5	0.59	-37.6	-3.4	0.53

Coefficient: see table 19 and 21 — contr.: contribution to forecast error (contr. = coefficient x error)
error: observed forecast error (% point) — share: % contribution to forecast error (share = contr. / GDP error)

The large underestimation of inflation in 1980 happened in a context of stagflation. The oil price hike was largely underestimated by USD 8.8 per barrel (37.6 % point, see table 23) and consequently also import prices. However, these elements explain only 33 % of the inflation error. The conjecture is that the size of the forecast error is related to the ill perceived domestic consequences of the oil price shock.

3. The impact of the external environment in perspective

A judgmental non-model based approach to forecasting is followed by the European Commission and an attempt is made to determine the contribution of various factors to the prediction mistake through a regression analysis. The contributions obtained in this study are confronted with those derived from models. It appears that the size of the (semi-)elasticity is comparable.

The Bundesbank (1989) analyses the 1.5 % overestimation of German GDP growth in 1988 in the framework of its econometric model which permits a more detailed analysis of the sources of prediction mistakes. It concludes that 20 % of the error is due to data revisions, 60 % to exogenous external factors (stock market crash, stronger world demand, unforeseen real depreciation of German mark) and 20 % to exogenous domestic factors (mild winter stimulating construction, stronger fiscal expansion, monetary relaxation). In the Bundesbank study a larger part of the error is explained by the external environment, but the latter is defined in a wider sense than here.

The Dutch Central Plan Bureau relies for its external environment on international institutions like the Commission and OECD. Donders and Kranendonk (1999) and Don (2000) found that knowledge of the international variables would reduce the Dutch GDP forecast error by 40 % on average, based on a sample ending in the mid 90's. This study suggest a higher responsibility for the external environment in explaining Dutch GDP errors (up to 80 % for the year ahead forecast mistake, see table 18).

[4] On the basis on the latest national accounts data GDP growth in the 9 countries included in the sample at that moment is 0.1 % against –0.4 % on the basis of the outturn data from Autumn 1982.

While the Commission Quest-model (Roeger and In't Veld, 1997) is not used for forecasting, its parameters and simulations are points of reference.

The exchange rate error elasticity of –0.10 in the regression explaining the EU export volume error (see table 20) appears on the low side compared to a price elasticity of about –0.30 in the Quest-model, but it could be explained by the use of the US dollar exchange rate in this study and the nominal effective exchange rate in the Quest model. The elasticity of market growth at 0.63 in the EU export error equation (see table 20) is reasonable; in the Quest-model the long-run elasticity is fixed at 1.

A 1 % point error in US GDP growth leads to a 0.34 % point error in EU GDP growth (table 18). This is large and suggests that other transmissions mechanisms are at work than just the trade channel. Assuming a US import elasticity of 2 and a US export share of 15 % in total EU trade which represents 35 % of EU GDP, the impact of a shock to US growth should be only 0.1 % point.

A 10 % euro appreciation in nominal effective terms is estimated by the Quest model to shave off about 0.9 % of EU GDP (box 7 in The European Economy: 1999 Review), but this is not examined here. The impact on inflation is estimated to be 0.8 % in the Quest model. Assuming that a bilateral euro/USD exchange rate appreciation yields only half the impact, the so-obtained elasticity of 0.04 (= 0.8 / 2 / 10) corresponds to the one obtained on the basis of tables 19 and 21, namely 0.035 (= 0.23 x 0.15).

For a USD 4 oil price hike (corresponding to an increase of 20 %) EU growth would be reduced by 0.1 % according to the Quest model (box 7 in The European Economy: 1999 Review). This elasticity of 0.005 (rounded to 0.01) can be compared to an elasticity of 0.01 in table 18. The impact on EU inflation of a oil price increase of USD 4 is estimated at 0.3 % implying an elasticity of 0.015 (= 0.3 / 20), corresponding well to an elasticity of 0.014 (= 0.09 x 0.15) calculated on the basis of tables 19 and 21.

In the reduced-from equation used in the present study a 1 %-point long-term interest rate overestimation leads to an overestimation of EU growth in the year ahead of 0.62 % -point (see table 18). While this could be rationalised in a yield curve frame work (see discussion in section XIV.1), a negative sign could have been expected. The Quest model estimated the impact of a 1 %-point increase in short-term interests on growth at between –0.45 and –0.57 % depending on the international environment (Roeger and In't Veld, 2002).

4. Summing up

Sometimes large errors are made, but they appear to become smaller over time and better explained in terms of forecast errors in external assumptions or in the international environment. The large GDP forecast errors can in general be better explained than those related to inflation. Especially, errors in forecasting US GDP growth lead to prediction mistakes in EU growth. About 60 % of the large overestimation of EU GDP in 2001, was caused by an overestimation of US GDP; about 30 % comes from a wrong (long-term) interest rates. However, the failure to foresee the 1993 recession cannot be attributed to the international economic environment (in fact the US recovery was underestimated). About 70 % of the forecast error had a domestic origin: the too high long-term interest rates reflected the belief that the EU economy would remain shielded from the recession which had affected the US 2 years earlier.

With respect to inflation, oil prices appear to be the most important variable inducing errors. The large drop in the oil price in 1998 was not foreseen and explains about 60 % of the inflation overestimation. The responsibility of the oil price error is not always that important. While in

1989, the underestimation of import prices can again be attributed for about 60 % to oil prices, the link between import price error and inflation error appears weaker.

In general the monetary assumptions play a lesser role, although the wrong signal coming from long-term interest rates is not of negligible importance for the size of the GDP forecast errors.

XVI. Conclusion

The accuracy of the external assumptions in the Commission Forecasts was assessed. The mean absolute error and the success rate in directional accuracy of the key assumptions are presented in table 24. It gives an idea about the error one is likely to make in setting the external assumptions, despite the change in the nature of variables. The euro replaced the German mark and the EU aggregate is now based on 15 countries instead of 10 in the beginning of eighties, when most of series start for this analysis.

The accuracy of the assumptions declines if the forecast horizon lengthens. Between the hypothesis for the current year and the year ahead, the mean absolute error roughly doubles. For example, the appreciation or depreciation in the US dollar is missed by 3.8 percentage points in the current year, while it increases to 7.7 percentage points in the year ahead. The price level of a barrel of crude Brent is missed by 1.7 USD in the current year and by 3.5 USD in the year ahead. This doubling of the error is less marked for the German(euro) short-term interest rate, where the error remains limited to 0.6 % in the year ahead, compared to 0.4 % in the current year. With a success rate of about 80 % or more in the current year, one can be reasonably certain that having the sign of the change correct was not just luck, which is the case for most of the external assumptions. The success rate in directional accuracy declines in the year ahead. It drops most for US short- and long-term interest rates. In the cast of the exchange rate and the oil price, it remains, though not significantly, above 50 %, which is the success rate one would obtain by flipping a coin.

Table 24: Key numbers about the accuracy of the external assumptions

		Short interest rates, %			Long interest rates, %			USD against DEM,	Brent crude
		D[1]	EU	US	D	EU	US	EUR after 1999, % ch	USD/barrel
Mean absolute error	Current year	0.4	0.4	0.5	0.3	0.4	0.5	3.78	1.7
	Year ahead	0.6	0.8	1.0	0.6	0.8	0.8	7.70	3.5
Success rate in directional accuracy	Current year	0.78	0.82	0.94	0.78	0.89	0.63	0.78	0.89
	Year ahead	0.71	0.65	0.71	0.71	0.76	0.25	0.64	0.63

[1] D = euro area from 1999
Current year refers to assumptions made in Spring for the same year; year ahead refers to assumptions made in Autumn for the following year.

The accuracy of long-term interest rates appears slightly better than for the other assumptions examined[5]. This is likely to be related to the volatility of the underlying variables. Oil prices and exchange rates seem more difficult to forecast.

The formulation of external assumptions in the Commission projections generally stands up well to most of the test statistics on accuracy.

[5] The interpretation of the reported error statistics for US long-term interest rates should take account of the short sample on which the calculations are based

Error persistency does not seem to be a major problem, meaning that when mistakes are made at a certain point in time, they quickly disappear. Assumptions are also set in an efficient way meaning that it is difficult to improve the formulation of the external assumptions on the basis of the information contained in data series. Only some short-term interest rate assumptions could be improved by exploiting better the information available in past mistakes. This appears the case for the US short-term interest rate assumptions for the year ahead where there was a tendency to set too high interest rates. For the current year, serial correlation among errors in Belgian (and Luxembourg) short-term interest rates assumptions and bias in Spanish, French and overall EU short-term interest assumptions led to inefficient predictions. In the case of exchange rates and oil prices the error is sometimes large, but tests suggest that it would not have been possible to improve the fit, by making better use of past mistakes.

The assumptions, as presently formulated, in general outperform also naïve alternative hypotheses. In particular the exchange rate is not better set using forward rates or, where available, the ERM central parities. Oil price assumptions based on futures prices result in about the same (root mean square) error as the one generated by the Commission procedure, suggesting that oil price futures could play a more important role in fixing the oil hypothesis than is at present the case.

There is one case where naïve alternatives performed better: the fixing of the Dutch guilder. Depending on the time horizon, using forward rates, the average exchange rate or central parities would have resulted in a smaller error than the one observed with the traditional Commission approach. One can, however, wonder whether these alternatives would have been real options for the Netherlands. Their success seems linked to the stability of the Dutch guilder, which was not guaranteed *ex ante*. Furthermore, it would have been inappropriate to differentiate the formulation of the exchange rate hypothesis by currency, as it could have stigmatised a currency as volatile. By extrapolation, this would suggest that the best approach to the formulation of the exchange rate hypothesis for the Candidate Countries is to stick to present Commission practices, to the extent that their situation is comparable to the Member States. That is, with respect to a reference period, fixing the nominal exchange rate if the currency belongs to an exchange rate arrangement or fixing the real exchange rate if the currency is floating. The question should be raised, however, whether the catching up nature of some of the Candidate Countries leading typically to a real appreciation of the exchange rate, justifies a deviation from the purchasing power parity rule.

With respect to bias, there is a tendency to set favourable external assumptions, but in general it is not significant in a statistical sense. Indeed currencies (DEM or EUR against USD and ERM currencies against DEM) are presented somewhat stronger than they afterwards turn out to be. Long-term interest rates and oil prices tend to be projected lower for the current year than what is verified later, but this is not significant and there is a shift from underestimation to overestimation when the forecast horizon lengthens. Only in the case of short-term interest rates set for the current year, are there a number of cases (the EU as a whole, Spain and France) where rates are significantly too low.

Over time, the setting of interest rates, both short and long, improved somewhat and this can probably be linked to the lower interest rate volatility. Also exchange rates and oil prices became less volatile, but this did not lead to improved accuracy. The error on the change in the US dollar remains of about the same (absolute) magnitude, but its recent underestimation (against the euro) has not always been observed.

Wrong external assumptions (interest rates, exchange rates, oil prices) or a wrong assessment of the international economic environment (US GDP, world trade, import prices) have important consequences. On average, they can explain up to about 60 % of the error made in forecasting GDP or inflation at the EU level. At the country level, the share of the prediction mistake explained by the external environment, here mainly defined as the economic environment

outside the EU, is smaller. Nevertheless, their impact may not be neglected: the smaller share is partially explained by the larger forecast error made at the country level.

Forecast errors in the external environment are large, but they are not fully transmitted to EU GDP and inflation, which display a smaller forecast error. However, when the forecast horizon lengthens and less information is available, the share of the forecast error explained by the external environment increases.

The international economic environment (US GDP, world trade and import prices) has a greater responsibility for avoiding mistakes in EU GDP and inflation than the external assumptions (interest rates, exchange rates, oil prices). Furthermore, GDP errors are better than inflation errors related to the external environment. In particular, the exchange rate assumptions which are set according to a technical rule, play only a minor role, but they appear to have some impact on the import price forecast errors. Wrong oil prices play a role in explaining large inflation forecast errors and wrong long-term interest rates result in erroneous GDP forecasts.

Sometimes very large errors are made, but they have declined, notably large inflation forecast errors were avoided recently. Reflecting probably the closer global integration, it appears that a larger share of the forecast error can be explained by a wrong external environment. The large overestimation by 1.6 % points of EU GDP in 2001 can for about 60 % be attributed to a mistaken forecast for US GDP and for 30 % to overestimated EU long-term interest rates signalling strong growth. With respect to EU inflation, about 60 % of the overestimation in 1998 (0.6 %-point) can be attributed to the assumption of a too high oil price.

All in all, the external environment explains a relatively important part of the forecast error. There is, however, not an obvious way to reduce this type of error. In general, there is not a systematic error in the external environment, which could be exploited to reduce the mistake. The only thing one can do is to pay the utmost attention to the description of the external environment when a forecasting round is started.

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Annex A: Data sources

The table lists from 1969 all available comprehensive short-term macroeconomic projections made by the European Commission, classified by finalisation date of the forecast document and indicates where the data for the analysis of the forecast accuracy are taken from. When available the cut-off date for inclusion of information in the forecasts is also mentioned.

Finalisation date	Current year forecast	Current year outturn	Year ahead forecast	Year ahead outturn	Cut-off date	Title of forecast document[a]	Publication
1969 June	1969					Preliminary Economic Budgets for 1970	
December			1970			Complete Economic Budgets for 1970	
1970 June	1970	1969				Preliminary Economic Budgets for 1971	
December			1971			Complete Economic Budgets for 1971	
1971 June	1971	1970				Preliminary Economic Budgets for 1972	
July		not used				Revised Preliminary Economic Budgets for 1972	
1972 January			1972	1970		Complete Economic Budgets for 1972	
June	1972	1971				Preliminary Economic Budgets for 1973	
August		not used				Revised Preliminary Economic Budgets for 1973	
1973 January, 10			1973	1971		Complete Economic Budgets for 1973	
June, 27	1973	1972				Preliminary Economic Budgets for 1974	
August, 17		not used				Revised Preliminary Economic Budgets for 1974	
December			1974	1972		Complete Economic Budgets for 1974	
1974 June, 20	1974	1973				Preliminary Economic Budgets for 1975	
August, 10		not used				Revised Preliminary Economic Budgets for 1975	
December, 19			1975	1973		Complete Economic Budgets for 1975	
1975 June, 23	1975	1974				Preliminary Economic Budgets for 1976	
September, 26			1976	1974		Revised Preliminary Economic Budgets for 1976	
1976 January, 23		not used				Complete Economic Budgets for 1976	
June, 9	1976	1975				Preliminary Economic Budgets for 1977	
July, 29		not used				Revised Preliminary Economic Budgets for 1977	
1977 January, 12			1977	1975		Complete Economic Budgets for 1977	
June, 7	1977	1976				Preliminary Economic Budgets for 1978	
September, 23			1978	1976		Revised Preliminary Economic Budgets for 1978	
1978 February, 20		not used				Complete Economic Budgets for 1978	
June, 25	1978	1977				Preliminary Economic Budgets for 1979	
October, 20			1979	1977		Revised Preliminary Economic Budgets for 1979	
1979 February, 20		not used				Summary of January 1979 Economic Forecasts	
June, 11	1979	1978				Summary of June 1979 Economic Forecasts	
October, 10			1980	1978		Summary of October 1979 Economic Forecasts	
1980 February, 12		not used				Economic forecasts, January 1980	
June, 5	1980	1979				Economic forecasts, May 1980	
October, 16			1981	1979		Economic forecasts, October1980	
							Supplement A
1981 February, 24		not used				Economic forecasts, January 1980	
June, 25	1981	1980			early June	Economic forecasts, May 1981	No 7, July
September, 25			1982	1980	not available	Economic forecasts, September/October 1981	not published
1982 March, 4		not used			March, 2	Economic forecasts 1982	No 4, April
June, 8	1982	1981			not available	Economic forecasts 1982-1983	not published
October, 6			1983	1981	October, 6	Economic forecasts 1982-1983	No 10, October

(table continued)

Finalisation date	Current year forecast	Current year outturn	Year ahead forecast	Year ahead outturn	Cut-off date	Title of forecast document[a]	Publication Supplement A
1985 February, 5		not used			January, 31	Economic forecasts 1984-1985	No 2, February
June, 7	1985	1984			June, 7	Economic forecasts 1985-1986	No 6, June
October, 8			1986	1984	October, 8	Economic forecasts 1985-1986	No 10, October
1986 March, 4		not used			not available	Economic forecasts 1985-1986	No 3, March
June, 22	1986	1985			June, 22	Economic forecasts 1986-1987	No 6, June
October, 6			1987	1985	October, 6	Economic forecasts 1986-1987	No 10, October
1987 January, 30		not used			not available	Economic forecasts 1986-1987	No 3, March
June, 4	1987	1986			June, 4	Economic forecasts 1987-1988	No 5, May
September, 28			1988	1986	September, 28	Economic forecasts 1987-1988	No 10, October
1988 February, 3		not used			February, 3	Economic forecasts 1987-1988	No 2, February
June, 14	1988	1987			June, 6	Economic forecasts 1988-1989	No 6, June
October, 7			1989	1987	October, 4	Economic forecasts 1988-1989	No 8/9, Aug/Sept
1989 January, 27		not used			January, 26	Economic forecasts 1989-1990	No 2, February
June, 12	1989	1988			June, 25	Economic forecasts 1989-1990	No 5/6, May/June
October, 12			1990	1988	September, 29	Economic forecasts 1989-1990	No 10, October
1990 June, 16	1990	1989			June, 2	Economic forecasts 1990-1991	No 4/5, April/May
November, 21			1991	1989	November, 19	Economic forecasts 1991-1992	No11/12, Nov/Dec
1991 June, 15	1991	1990			June, 8	Economic forecasts 1991-1992	No 5, May
November, 18			1992	1990	November, 12	Economic forecasts 1992-1993	No 11/12, Nov/Dec
1992 June, 14	1992	1991			June, 6	Economic forecasts 1992-1993	No 5/6, May/June
1993 January, 15			1993	1991	January, 11	Economic forecasts 1993-1994	No 1/2, Jan/Feb
June, 18	1993	1992			June, 14	Economic forecasts 1993-1994	No 6/7, June/July
November, 10			1994	1992	November, 8	Economic forecasts 1993-1995	No 11/12, Nov/Dec
1994 June, 11	1994	1993			June, 5	Economic forecasts 1994-1995	No 5, May
November, 22			1995	1993	November, 17	Economic forecasts 1994-1996	No 11/12, Nov/Dec
1995 June, 10	1995	1994			June, 2	Economic forecasts 1995-1996	No 4/5, April/May
November, 15			1996	1994	November, 15	Economic forecasts 1995-1997	No 12, December
1996 June, 15	1996	1995			June, 10	Economic forecasts 1996-1997	No 5/6, May/June
October, 30			1997	1995	October, 23	Economic forecasts 1996-1998	No 12, December
1997 April, 18	1997	1996			April, 15	Economic forecasts 1997-1998	No 5, May
October, 14			1998	1996	October, 9	Economic forecasts 1997-1999	No 10, October
1998 March, 18	1998	1997			March, 16	Economic forecasts 1998-1999	No 3/4, March/April
October, 20			1999	1997	October, 14	Economic forecasts 1998-2000	No 10, October
1999 March, 19	1999	1998			March, 19	Economic forecasts 1999-2000	No 4, April
October, 28			2000	1998	October, 28	Economic forecasts 1999-2001	No 10/11, Oct./Nov.
2000 March, 21	2000	1999			March, 21	From here, idem to the publication	No 1/2, April
November, 10			2001	1999	October, 26	in Supplement A of European Economy	No 10/11, Oct./Nov.
2001 April, 6	2001	2000			April, 6		No 3/4, March/April
November, 16				2000	November ,12		No 10/11, Oct./Nov.

Annex B: Data set

General notes to the tables.

The source for the forecast (F) and realisation (R) data is given in annex A, unless notes to the tables indicate otherwise. Holes in the series are filled following a 'severe' approach where possible. Hence, missing forecast data are selected from an earlier forecast, while missing outturn data are selected from a later publication. In the case of interest rates, exchange rates and oil prices the realisation data in the case of the current year forecasts and year ahead forecasts are the same.

The calculation of the EU aggregate has evolved over time. Initially exchange rates were used, but after the introduction of Purchasing Power Standards (PPS), Member States volume data were converted into PPS of a fixed base year, simply added and consequently the growth rate of the aggregate was calculated. In the early nineties this method to calculate the growth rate after aggregation was replaced by a procedure of aggregation of growth rates. The weights are the PPS values of the previous year. From 2001, wtith the introduction of the single currency, the weights are the euro values in current prices of the pr

Past publications often do not mention the EU average which had to be recalculated ex post (indicated with "CAL") using the appropriate weighting scheme. For the volume growth rates of GDP, exports and imports as well as for the annual changes of the private consumption deflator and import prices the respective PPS weights and from 2001 the euro values in current prices were used.

When new Member States joined the European Union the EU average did not comprise the same countries in the forecast data and in the outturn data. The new entrants are covered only from the accession year: Denmark, Ireland and the United Kingdom in 1973; Greece in 1981; Spain and Portugal in 1986; Austria, Finland and Sweden in 1995. Outturn data for the EU have been recalculated to eliminate the impact of the new Member States.

The year ahead forecast for the EU in 1995 is based on 16 countries as it includes Norway, which was thought to join at the same time as Austria, Finland and Sweden. It turned out differently and hence the corresponding realisation data for the EU aggregate are based on only 15 countries. This has not been corrected.

West-Germany until 1992; unified Germany from 1993.

This data set is available on request by sending an e-mail to Filip.Keereman@cec.eu.int

Table B1: Short-term interest rates (% p.a.) - current year

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union		Un. States	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
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1983	11.8	10.5	15.0	12.0	5.0	5.8	16.0	12.4			11.5	12.4	14.8	14.0	17.0	17.8	11.8	10.5	4.8	5.7			10.3	10.1	9.5	10.8	7.5	8.7
1984	13.0	11.5	12.0	11.5	5.8	6.0	20.0	20.0			11.5	11.6	12.5	13.2	15.3	17.3	13.0	11.5	5.9	6.1			8.5	10.0	9.4	10.6	10.0	9.5
1985	10.5	9.6	11.0	10.0	6.3	5.4	20.0	20.0			10.3	9.9	13.8	11.9	15.0	15.2	10.5	9.6	6.6	6.4			11.5	12.2	10.3	10.1	7.8	8.0
1986	8.0	7.9	7.6	9.1	3.9	4.6	19.5	19.8	10.5	11.7	7.2	7.7	11.5	12.6	12.6	13.3	8.0	7.9	4.9	5.7	16.3	15.6	10.9	10.9	8.1	8.6	6.1	5.4
1987	6.7	7.1	10.8	9.9	3.7	4.0	16.5	15.6	13.5	15.8	7.7	8.2	13.3	11.1	10.2	11.4	6.7	7.1	5.0	5.4	12.9	13.9	9.6	9.7	8.2	8.8	5.5	5.9
1988	6.0	6.7	8.6	8.3	3.4	4.3	18.2	15.9	11.0	11.6	8.0	7.9	8.3	8.1	11.6	11.3	6.0	6.7	3.7	4.8	12.9	13.0	7.9	10.3	7.8	8.5	6.3	6.9
1989	8.5	8.8	8.5	9.4	6.5	7.1	16.3	18.7	14.5	15.0	8.4	9.4	8.2	9.8	13.0	12.7	8.5	8.8	6.8	7.4	13.5	12.6	12.8	13.9	10.3	10.9	5.1	8.4
1990	10.4	9.8	12.1	10.8	8.5	8.4	19.6	20.0	15.5	15.2	10.8	10.3	12.3	11.4	13.3	12.3	10.4	9.8	9.0	8.7	14.0	16.9	15.0	14.8	12.0	11.7	8.0	7.8
1991	8.9	9.4	9.5	9.5	9.2	9.2	21.5	22.7	13.2	13.2	9.0	9.6	10.0	10.4	13.0	12.2	8.9	9.4	8.8	9.3	17.5	17.7	11.5	11.5	10.9	10.8	5.5	5.5
1992	9.4	9.4	9.7	11.5	9.4	9.5	20.5	23.5	12.4	13.7	9.7	9.8	10.1	13.9	12.1	14.8	9.4	9.4	9.4	8.5	16.5	14.9	10.3	7.5	10.6	10.9	4.1	3.5
1993	7.3	8.2	9.4	10.8	7.1	7.2	19.1	23.5	11.7	11.7	8.1	8.6	8.0	9.3	10.4	10.2	7.3	8.2	6.8	6.9	12.1	13.3	6.0	5.9	8.4	8.6	3.1	3.1
1994	5.5	5.7	5.5	6.2	5.2	5.3	18.0	24.5	7.3	8.0	5.5	5.9	5.5	5.9	7.9	8.5	5.5	5.7	5.0	5.2	9.4	11.1	5.1	5.5	6.1	6.5	4.0	4.7
1995	5.1	4.7	5.8	6.1	4.8	4.5	16.2	16.4	8.8	9.4	5.4	6.6	6.7	6.3	10.2	10.3	5.1	4.7	4.8	4.4	8.8	9.8	7.0	6.7	6.6	6.7	6.5	6.0
1996	3.1	3.2	3.7	3.9	3.1	3.3	12.5	13.8	7.1	7.5	3.6	3.9	5.0	5.4	8.5	8.7	3.1	3.2	2.9	3.0	6.8	7.4	5.8	6.0	4.9	5.1	5.4	5.5
1997	3.0	3.5	3.4	3.7	3.0	3.3	10.5	12.8	5.7	5.4	3.2	3.5	6.0	6.1	6.5	6.8	3.0	3.5	2.9	3.3	5.8	5.8	6.3	6.8	4.3	4.7	5.6	5.7
1998	3.5	3.6	3.9	4.1	3.5	3.5	12.5	14.4	4.1	4.3	3.5	3.6	4.8	5.5	4.9	5.0	3.5	3.6	3.5	3.4	4.1	4.3	7.0	7.5	4.4	4.7	5.5	5.5
1999			3.2	3.4	2.8	3.0	8.8	10.1															5.1	5.5	3.3	3.5	5.2	5.4
2000			4.0	5.0	3.7	4.4	6.7	7.9															6.3	6.1	4.2	4.7	6.5	6.5
2001			5.2	4.7	4.6	4.3																	5.3	5.0	4.7	4.4	4.9	3.8

Table B2: Short-term interest rates (% p.a.) - year ahead

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union		Un. States	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969																												
1970																												
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1983																												
1984	10.0	11.5	14.5	11.5	5.5	6.0	17.0	20.0			12.0	11.6	13.0	13.2	15.0	17.3	10.0	11.5	5.5	6.1			10.0	10.0	9.5	10.6	10.0	9.5
1985	10.6	9.6	11.5	10.0	5.8	5.4	10.5	20.0			10.5	9.9	11.9	11.9	13.9	15.2	10.6	9.6	5.3	6.4			9.5	12.2	9.6	10.1	10.8	8.0
1986	9.0	7.9	7.5	9.1	4.1	4.6	19.0	19.8			8.4	7.7	10.5	12.6	13.0	13.3	9.0	7.9	5.4	5.7			9.8	10.9	8.4	8.6	6.4	5.4
1987	7.1	7.1	9.5	9.9	4.0	4.0	16.0	15.6	10.5	15.8	6.3	8.2	9.0	11.1	9.9	11.4	7.1	7.1	4.7	5.4	13.5	13.9	9.5	9.7	7.5	8.8	5.9	5.9
1988	6.6	6.7	10.2	8.3	3.5	4.3	15.5	15.9	12.7	11.6	7.5	7.9	9.9	8.1	11.3	11.3	6.6	6.7	4.7	4.8	12.6	13.0	9.9	10.3	8.3	8.5	7.5	6.9
1989	6.9	8.8	8.5	9.4	4.7	7.1	16.5	18.7	10.5	15.0	7.9	9.4	7.6	9.8	12.2	12.7	6.9	8.8	5.5	7.4	12.1	12.6	11.0	13.9	8.8	10.9	7.5	8.4
1990	8.0	9.8	8.5	10.8	6.8	8.4	20.0	20.0	14.5	15.2	7.8	10.3	9.7	11.4	12.7	12.3	8.0	9.8	6.8	8.7	13.5	16.9	13.0	14.8	10.2	11.7	8.2	7.8
1991	10.0	9.4	10.3	9.5	9.4	9.2	20.5	22.7	15.0	13.2	10.5	9.6	11.3	10.4	11.8	12.2	10.0	9.4	9.5	9.3	15.0	17.7	13.5	11.5	11.6	10.8	7.8	5.5
1992	9.4	9.4	9.4	11.5	9.4	9.5	18.5	23.5	12.0	13.7	9.4	9.8	9.4	13.9	12.0	14.8	9.4	9.4	9.4	8.5	16.0	14.9	9.9	7.5	10.4	10.9	6.0	3.5
1993	7.3	8.2	10.5	10.8	7.5	7.2	17.9	23.5	12.4	11.7	8.8	8.6	10.5	9.3	13.3	10.2	7.3	8.2	7.5	6.9	13.3	13.3	6.5	5.9	9.3	8.6	3.5	3.1
1994	6.9	5.7	6.4	6.2	5.4	5.3	21.0	24.5	8.0	8.0	5.4	5.9	5.6	5.9	7.6	8.5	6.9	5.7	5.1	5.2	9.0	11.1	5.3	5.5	6.3	6.5	3.9	4.7
1995	5.3	4.7	5.8	6.1	5.0	4.5	18.0	16.4	7.7	9.4	5.4	6.6	5.9	6.3	8.5	10.3	5.3	4.7	5.0	4.4	9.0	9.8	6.3	6.7	6.4	6.7	6.0	6.0
1996	3.9	3.2	5.1	3.9	3.8	3.3	12.4	13.8	8.5	7.5	5.0	3.9	5.4	5.4	9.3	8.7	3.9	3.2	3.7	3.0	8.5	7.4	6.1	6.0	5.8	5.1	5.9	5.5
1997	2.8	3.5	3.2	3.7	2.8	3.3	10.8	12.8	6.2	5.4	3.1	3.5	6.2	6.1	6.7	6.8	2.8	3.5	2.6	3.3	6.2	5.8	6.0	6.8	4.3	4.7	5.8	5.7
1998	3.5	3.6	4.0	4.1	3.5	3.5	9.8	14.4	4.5	4.3	3.5	3.6	5.0	5.5	5.0	5.0	3.5	3.6	3.5	3.4	4.5	4.3	7.0	7.5	4.4	4.7	5.9	5.5
1999			4.1	3.4	3.5	3.0	11.0	10.1															6.7	5.5	4.1	3.5	5.0	5.4
2000			3.3	5.0	3.0	4.4	7.0	7.9															6.0	6.1	3.6	4.7	5.1	6.5
2001			6.0	4.7	5.6	4.3																	6.2	5.0	5.7	4.4	6.6	3.8

Table B3: Long-term interest rates (% p.a.) - current year

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union		Un. States	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969																												
1970																												
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1983	12.0	11.8	15.0	14.4	7.0	7.9	13.5	20.8			13.6	14.4	14.0	13.9	18.3	18.0	12.0	11.8	7.8	8.8			10.8	10.8	11.2	12.2		
1984	12.0	12.0	13.8	14.0	8.0	7.8	21.0	18.5			13.3	13.4	14.0	14.6	16.0	14.9	12.0	12.0	8.5	8.6			10.0	10.7	11.2	11.4		
1985	10.5	10.6	11.0	11.6	6.3	6.9	20.0	15.6			10.3	11.9	13.8	12.7	15.0	13.0	10.5	10.6	6.6	7.8			11.5	10.6	10.4	10.3		
1986	8.7	7.9	8.9	10.5	5.6	5.9	14.0	15.8	11.7	11.4	9.5	8.4	9.8	11.1	11.8	11.7	8.7	7.9	6.6	6.4	23.6	17.9	10.2	9.8	8.8	8.6		
1987	7.3	7.8	12.2	11.9	5.8	5.8	14.5	17.2	10.0	12.8	8.8	9.4	12.3	11.3	8.4	11.3	7.3	7.8	6.6	6.4	15.0	15.4	9.5	9.5	8.4	9.3		
1988	7.5	7.9	10.7	10.6	5.7	6.1	19.2	16.6	12.0	11.8	9.1	9.0	10.2	9.4	12.3	12.1	7.5	7.9	6.1	6.3	14.0	14.2	9.2	9.3	9.3	9.3		
1989	8.5	8.7	10.0	10.2	7.1	7.0	15.9	20.6	13.0	13.8	8.7	8.8	8.6	9.0	13.0	12.9	8.5	8.7	7.0	7.2	14.7	14.9	9.4	9.6	9.8	10.0		
1990	10.6	10.1	11.0	11.0	8.9	8.9	23.2	22.0	14.7	14.7	10.0	9.9	9.9	10.1	13.3	13.4	10.6	10.1	8.9	9.0	15.2	16.8	11.5	11.1	11.3	11.2		
1991	9.0	9.3	9.6	10.1	9.0	8.6	23.0	23.5	12.8	12.4	8.7	9.0	9.0	9.2	13.5	13.0	9.0	9.3	8.7	8.9	17.6	17.1	10.0	9.9	10.6	10.2		
1992	8.7	8.6	9.6	8.9	8.2	8.0	21.0	25.0	11.8	12.4	8.7	9.0	8.8	9.2	12.5	13.0	8.7	8.6	8.3	8.9	16.0	15.4	9.4	9.9	10.6	9.9		
1993	6.8	7.2	8.2	8.8	6.6	6.3			11.5	10.2	7.1	6.8	8.5	7.7	12.6	11.3	6.8	7.2	6.7	6.7	12.6	12.5	8.2	7.8	8.7	8.1	7.1	6.6
1994	6.7	7.8	6.7	8.5	6.0	6.7			8.1	9.7	5.6	7.4	6.3	8.1	8.8	10.6	6.7	7.8	6.1	7.2	9.9	10.8	6.8	8.1	7.0	8.0	6.8	7.4
1995	8.2	7.5	8.9	8.3	7.4	6.8			11.9	11.3	8.1	7.6	8.7	8.3	12.2	11.9	8.2	7.5	7.8	6.9	10.9	11.5	8.9	8.2	8.9	8.3	7.4	6.6
1996	6.4	6.5	6.9	7.2	6.1	6.2			9.1	8.7	6.3	6.3	7.3	7.3	9.4	9.2	6.4	6.5	6.1	6.2	9.1	8.6	7.7	7.8	7.1	7.2	6.4	6.4
1997	5.6	5.8	6.2	6.2	5.6	5.7	10.8	9.3	6.6	6.4	5.6	5.6	6.4	6.3	7.0	6.7	5.6	5.6	5.6	5.6	6.5	6.4	7.5	7.0	6.2	6.1	6.6	6.3
1998	5.3	4.7	5.5	5.0	5.1	4.6	9.4	8.5	5.4	4.8	5.1	4.6	5.4	4.8	5.5	4.8	5.1	4.7	5.1	4.6	5.1	5.0	5.7	5.7	6.0	4.9	5.2	5.4
1999	4.1	4.8	4.1	4.9	3.9	4.5	5.9	6.4	4.1	4.7	3.9	4.6	4.1	4.6	4.1	4.8	3.9	4.6	3.9	4.6	4.1	4.8	4.5	5.0	4.1	4.7	4.7	5.6
2000	5.8	5.6	5.9	5.6	5.6	5.3	6.2	6.5	5.8	5.5	5.7	5.4	5.8	5.4	5.8	5.6	5.7	5.4	5.7	5.4	5.9	5.6	5.8	5.3	5.7	5.4	6.6	6.0
2001	5.3	5.1	5.3	5.1	5.0	4.8	5.6	5.3	5.2	5.1	5.1	5.0	5.1	4.9	5.3	5.2	5.1	5.0	5.1	5.0	5.3	5.2	5.0	4.9	5.1	4.9	5.2	5.0

Table B4: Long-term interest rates (% p.a.) - year ahead

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union		Un. States	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969																												
1970																												
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1984	11.5	12.0	13.0	14.0	7.5	7.8	16.0	18.5			13.0	13.4	13.0	14.6	15.5	14.9	11.5	12.0	8.0	8.6			10.0	10.7	10.8	11.4		
1985	11.4	10.6	13.5	11.6	7.8	6.9	20.0	15.6			13.0	11.9	13.8	12.7	14.0	13.0	11.4	10.6	8.3	7.8			10.3	10.6	11.1	10.3		
1986	9.2	7.9	8.5	10.5	5.9	5.9	18.5	15.8			10.0	8.4	10.8	11.1	12.3	11.7	9.2	7.9	6.9	6.4			9.8	9.8	9.2	8.6		
1987	7.2	7.8	10.5	11.9	5.1	5.8	14.5	17.2	10.6	12.8	7.5	9.4	8.8	11.3	8.7	11.3	7.2	7.8	6.1	6.4	16.5	15.4	9.5	9.5	7.5	9.3		
1988	7.4	7.9	11.0	10.6	5.7	6.1	16.0	16.6	12.3	11.8	8.5	9.0	10.5	9.4	11.6	12.1	7.4	7.9	6.4	6.3	14.3	14.2	9.5	9.3	9.1	9.3		
1989	8.2	8.7	10.5	10.2	6.8	7.0	17.5	20.6	10.5	13.8	9.2	8.8	9.0	9.0	12.5	12.9	8.2	8.7	6.7	7.2	13.3	14.9	9.8	9.6	9.6	10.0		
1990	8.5	10.1	9.5	11.0	7.0	8.9	19.0	22.0	13.2	14.7	8.2	9.9	9.2	10.1	13.0	13.4	8.5	10.1	7.1	9.0	14.5	16.8	9.2	11.1	9.7	11.2		
1991	10.2	9.3	10.7	10.1	9.7	8.6	23.0	23.5	15.0	12.4	10.5	9.0	10.4	9.2	13.4	13.0	10.2	9.3	9.0	8.9	16.3	17.1	11.3	9.9	11.6	10.2		
1992	9.0	8.6	9.1	8.9	8.8	8.0	19.5	25.0	11.9	12.4	9.0	9.0	9.0	9.2	13.0	13.0	9.0	8.6	8.9	8.9	16.1	15.4	9.4	9.9	10.3	9.9		
1993	7.9	7.2	9.8	8.8	7.4	6.3			12.7	10.2	8.0	6.8	9.6	7.7	13.0	11.3	8.8	7.2	7.6	6.7	14.3	12.5	8.8	7.8	9.5	8.1	7.7	6.6
1994	6.8	7.8	6.5	8.5	5.8	6.7			8.8	9.7	5.8	7.4	6.8	8.1	9.1	10.6	6.8	7.8	6.8	7.2	10.3	10.8	6.9	8.1	6.9	8.0	6.5	7.4
1995	7.9	7.5	8.2	8.3	7.2	6.8			10.5	11.3	7.7	7.6	8.0	8.3	10.7	11.9	7.9	7.5	7.6	6.9	10.7	11.5	8.5	8.2	8.6	8.3	8.2	6.6
1996	7.0	6.5	7.8	7.2	6.3	6.2			10.4	8.7	7.1	6.3	7.9	7.3	10.6	9.2	7.0	6.5	6.7	6.2	10.4	8.6	7.9	7.8	7.7	7.2	6.2	6.4
1997	6.2	5.8	6.7	6.2	6.1	5.7	11.3	9.3	7.6	6.4	6.2	5.6	7.1	6.3	7.1	6.7	6.2	5.6	6.1	5.6	7.6	6.4	7.7	7.0	6.8	6.1	6.9	6.3
1998	5.9	4.7	6.4	5.0	5.8	4.6	8.6	8.5	6.2	4.8	5.8	4.6	6.1	4.8	6.4	4.8	5.8	4.7	5.8	4.6	6.2	5.0	6.7	5.7	6.1	4.9	6.5	5.4
1999	4.7	4.8	5.0	4.9	4.5	4.5	6.7	6.4	4.8	4.7	4.5	4.6	4.6	4.6	4.8	4.8	4.5	4.6	4.5	4.6	4.8	4.8	5.2	5.0	4.7	4.7	4.8	5.6
2000	5.5	5.6	5.6	5.6	5.2	5.3	6.4	6.5	5.5	5.5	5.3	5.4	5.4	5.4	5.5	5.6	5.4	5.4	5.4	5.4	5.5	5.6	5.7	5.3	5.4	5.4	6.0	6.0
2001	5.9	5.1	5.9	5.1	5.6	4.8	6.1	5.3	5.9	5.1	5.8	5.0	5.8	4.9	5.9	5.2	5.7	5.0	5.7	5.0	5.9	5.2	5.6	4.9	5.7	4.9	6.2	5.0

Table B5: Exchange rates (annual % change against DEM or EUR after 1999) - current year

	BEF		DKK		USD		GRD		ESP		FRF		IRP		ITL		LUF		NLG		PTE		GBP	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969																								
1970																								
1971																								
1972																								
1973																								
1974																								
1975																								
1976																								
1977																								
1978																								
1979	0.8	2.2	1.4	4.7	8.6	9.8					2.5	3.5	1.7	2.8	6.7	7.5	0.8	2.2	0.2	1.8			1.9	-0.5
1980	2.0	0.2	10.1	7.7	1.7	0.5					1.4	-0.2	2.5	0.8	5.7	3.6	2.0	0.2	1.2	-0.3			-2.2	-8.6
1981	1.9	2.2	2.1	1.8	-15.7	-19.5	0.7	4.3			2.7	3.0	2.0	1.6	6.9	6.9	1.9	2.2	1.2	1.2			-9.5	-7.3
1982	15.3	14.5	9.7	8.9	-6.2	-6.8	13.8	12.6			12.9	13.3	6.7	6.2	10.6	10.8	15.3	14.5	-0.2	-0.5			7.6	7.9
1983	5.9	6.4	5.2	4.3	2.9	-4.9	28.1	25.0			11.0	10.1	9.7	8.5	9.4	6.7	5.9	6.4	1.8	1.6			18.9	9.6
1984	2.2	1.5	2.7	1.7	-2.4	-10.2	18.5	14.8			3.8	3.0	4.2	2.9	5.3	3.8	2.2	1.5	0.8	0.9			-2.4	2.2
1985	-0.8	-0.7	-0.6	-1.0	-6.5	-3.1	15.1	19.2			0.1	-0.6	0.0	-0.9	3.4	5.2	-0.8	-0.7	0.1	0.0			2.7	0.2
1986	1.3	2.1	2.2	3.6	26.8	35.3	40.2	37.1	10.3	11.5	3.7	4.6	2.6	7.2	5.5	5.8	1.3	2.1	0.0	0.0	18.1	18.2	11.3	19.1
1987	0.7	0.9	1.3	1.9	18.8	20.6	18.7	16.8	9.4	6.3	4.3	4.7	8.6	8.6	3.7	5.0	0.7	0.9	0.0	-0.1	13.5	13.6	10.5	8.0
1988	0.6	0.7	0.8	0.7	7.5	2.4	10.4	7.1	-1.7	-3.4	1.2	1.4	0.3	0.0	2.6	2.7	0.6	0.7	-0.3	-0.1	5.4	4.5	-4.2	-5.8
1989	0.0	0.1	1.5	1.5	-6.2	-6.7	7.5	7.0	-6.1	-5.0	-0.2	0.0	0.1	0.3	-1.1	-1.6	0.0	0.1	0.2	0.3	2.1	2.2	-2.6	1.5
1990	-0.3	-1.3	-0.6	-1.5	12.4	16.4	13.3	13.6	2.7	0.1	0.2	-0.7	0.6	-0.3	1.9	1.6	-0.3	-1.3	-0.1	-0.1	7.6	5.4	9.0	7.1
1991	-0.4	-0.4	0.3	0.7	1.6	-2.5	13.7	11.9	-1.2	-0.6	1.0	0.9	0.2	0.1	0.6	0.8	-0.4	-0.4	0.0	0.0	-0.9	-1.3	-1.9	-1.8
1992	-0.1	0.0	0.5	0.2	-0.4	6.2	9.9	11.2	0.6	4.5	-0.2	-0.3	0.0	0.5	0.5	5.4	-0.1	0.0	-0.2	-0.1	-1.2	-0.8	2.0	6.2
1993	0.1	1.5	-0.5	1.4	-5.4	-5.6	11.9	13.4	13.2	17.2	0.1	1.0	6.3	9.6	18.4	20.6	0.1	1.5	-0.1	-0.3	8.6	12.3	11.2	11.0
1994	-0.9	-1.4	-0.7	0.0	-4.9	2.0	6.6	8.0	6.4	7.5	-0.8	-0.1	-2.4	-0.1	0.3	4.7	-0.9	-1.4	-0.2	-0.2	4.1	5.4	-3.8	0.0
1995	0.1	-0.2	1.9	-0.2	13.8	13.1	9.6	8.1	9.7	5.3	3.1	1.8	6.9	5.6	18.6	14.3	0.1	-0.2	-0.1	-0.1	2.5	2.3	9.2	9.8
1996	-0.1	0.1	-1.3	-1.4	-4.1	-4.7	0.4	-1.0	-3.9	-3.2	-2.3	-2.3	-2.1	-4.5	-7.5	-9.8	-0.1	0.1	-0.1	0.1	-1.7	-2.1	-0.5	-3.7
1997	0.2	0.2	-1.1	-1.2	-11.1	-13.2	-1.9	-1.6	0.6	0.3	-0.8	-1.0	-9.4	-8.4	-3.2	-4.3	0.2	0.2	0.3	0.4	-2.1	-1.5	-13.8	-17.3
1998	0.0	0.0	0.0	0.0	-4.7	-1.5	8.3	6.6	0.4	0.5	-0.4	-0.4	4.6	4.9	0.2	0.5	0.0	0.0	0.2	0.1	1.3	1.3	-6.0	-2.6
1999			-0.9	-0.8	-1.4	-4.4	-1.9	-0.8															1.2	-2.4
2000			0.0	0.1	-4.7	-14.0	1.6	3.4															-6.1	-7.6
2001			0.1	0.1	2.2	-2.2																	4.9	1.6

+ : appreciation of DEM or EUR

Table B6: Exchange rates (annual % change against DEM or EUR after 1999) - year ahead

	BEF		DKK		USD		GRD		ESP		FRF		IRP		ITL		LUF		NLG		PTE		GBP	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969																								
1970																								
1971																								
1972																								
1973																								
1974																								
1975																								
1976																								
1977																								
1978																								
1979																								
1980	1.7	0.2	3.4	7.7	2.5	0.5	0.0	0.0			1.9	-0.2	3.6	0.8	2.2	3.6	1.7	0.2	1.5	-0.3			-1.9	-8.6
1981	1.4	2.2	1.5	1.8	2.3	-19.5	0.0	0.0			2.5	3.0	1.8	1.6	3.7	6.9	1.4	2.2	0.4	1.2			2.7	-7.3
1982	4.8	14.5	5.0	8.9	1.8	-6.8	14.3	12.6			5.8	13.3	3.0	6.2	8.8	10.8	4.8	14.5	0.2	-0.5			9.4	7.9
1983	6.4	6.4	8.0	4.3	0.0	-4.9	12.7	25.0			10.8	10.1	3.8	8.5	9.0	6.7	6.4	6.4	-0.8	1.6			1.2	9.6
1984	1.6	1.5	2.8	1.7	-3.7	-10.2	15.6	14.8			3.9	3.0	4.0	2.9	6.1	3.8	1.6	1.5	0.7	0.9			1.7	2.2
1985	0.5	-0.7	0.7	-1.0	-2.1	-3.1	16.6	19.2			1.0	-0.6	2.0	-0.9	2.5	5.2	0.5	-0.7	0.0	0.0			5.4	0.2
1986	1.0	2.1	2.0	3.6	15.9	35.3	21.2	37.1			1.8	4.6	2.2	7.2	8.5	5.8	1.0	2.1	-0.2	0.0			1.2	19.1
1987	1.1	0.9	1.3	1.9	7.8	20.6	13.0	16.8	5.0	6.3	3.0	4.7	5.8	8.6	2.3	5.0	1.1	0.9	0.0	-0.1	12.6	13.6	6.9	8.0
1988	0.8	0.7	2.4	0.7	4.7	2.4	10.9	7.1	2.1	-3.4	1.7	1.4	1.2	0.0	2.1	2.7	0.8	0.7	0.0	-0.1	6.3	4.5	0.5	-5.8
1989	0.2	0.1	-4.5	1.5	-3.5	-6.7	8.9	7.0	-0.6	-5.0	0.0	0.0	-0.3	0.3	0.0	-1.6	0.2	0.1	0.3	0.3	1.2	2.2	-0.3	1.5
1990	-0.2	-1.3	0.0	-1.5	-0.4	16.4	9.1	13.6	-0.1	0.1	-0.2	-0.7	0.0	-0.3	-0.8	1.6	-0.2	-1.3	0.0	-0.1	4.1	5.4	1.9	7.1
1991	0.5	-0.4	0.8	0.7	5.8	-2.5	10.1	11.9	-0.3	-0.6	0.6	0.9	0.6	0.1	1.0	0.8	0.5	-0.4	1.0	0.0	3.3	-1.3	-1.7	-1.8
1992	0.1	0.0	0.2	0.2	-0.2	6.2	8.7	11.2	1.2	4.5	0.3	-0.3	-0.1	0.5	0.2	5.4	0.1	0.0	0.0	-0.1	-0.5	-0.8	0.8	6.2
1993	0.0	1.5	0.2	1.4	-6.1	-5.6	10.7	13.4	9.9	17.2	0.1	1.0	1.2	9.6	10.3	20.6	0.0	1.5	-0.2	-0.3	3.1	12.3	13.0	11.0
1994	1.2	-1.4	2.2	0.0	-1.8	2.0	7.9	8.0	4.8	7.5	1.2	-0.1	2.1	-0.1	1.6	4.7	1.2	-1.4	0.0	-0.2	4.2	5.4	-1.2	0.0
1995	0.0	-0.2	0.4	-0.2	5.0	13.1	7.1	8.1	0.6	5.3	0.2	1.8	1.3	5.6	2.5	14.3	0.0	-0.2	0.0	-0.1	0.0	2.3	2.7	9.8
1996	0.0	0.1	-0.9	-1.4	-1.6	-4.7	2.4	-1.0	-1.3	-3.2	-0.9	-2.3	-0.8	-4.5	-1.6	-9.8	0.0	0.1	-0.1	0.1	-0.3	-2.1	0.1	-3.7
1997	0.1	0.2	-0.4	-1.2	-0.9	-13.2	0.0	-1.6	-0.1	0.3	-0.5	-1.0	-1.9	-8.4	5.0	-4.3	0.1	0.2	0.1	0.4	-0.9	-1.5	-1.8	-17.3
1998	0.0	0.0	-0.1	0.0	-3.5	-1.5	0.1	6.6	0.0	0.5	-0.2	-0.4	-0.9	4.9	-0.6	0.5	0.0	0.0	0.1	0.1	0.5	1.3	-1.8	-2.6
1999	0.0	0.0	-0.7	-0.8	6.6	-4.4	2.6	-0.8	0.1	0.2	0.0	0.1	0.8	0.9	0.3	0.3	0.0	0.0	0.0	0.0	0.1	0.1	3.9	-2.4
2000			0.0	0.1	-0.5	-14.0	0.5	3.4															-0.9	-7.6
2001			0.3	0.1	-3.2	-2.2																	1.6	1.6

+ : appreciation of DEM or EUR

Table B7: Oil prices, US GDP and world trade
- current year

	Oil price				US GDP		World imports	
	USD/barrel		% change					
	F	R	F	R	F	R	F	R
1969								
1970								
1971								
1972								
1973								
1974					0.5	-2.2	5.5	8.0
1975	13.7	13.1	7.9	3.1	-5.0	-2.0	1.5	-8.5
1976	15.1	13.7	15.3	4.6	7.0	6.2	7.5	10.0
1977	14.8	15.0	8.0	9.5	5.0	4.9	7.0	4.5
1978	15.2	12.9	1.3	-13.7	4.0	4.0	4.5	4.8
1979	16.4	19.2	27.0	48.3	2.5	2.3	4.8	6.7
1980	30.7	32.3	59.9	68.2	-0.7	-0.2	3.0	2.0
1981	36.1	36.5	11.7	13.0	1.6	2.0	-0.2	0.1
1982	33.4	33.9	-8.5	-7.1	-1.7	-2.2	3.4	-0.9
1983	29.2	29.9	-13.9	-11.8	2.4	3.3	0.5	2.0
1984	28.5	28.5	-4.7	-4.8	5.9	6.8	6.7	9.3
1985	27.7	27.5	-2.5	-3.5	2.7	2.2	5.3	3.3
1986	14.4	13.7	-47.7	-50.1	2.5	2.5	3.8	4.7
1987	15.0	18.0	9.5	31.0	2.3	2.9	3.7	5.6
1988	16.0	14.9	-10.9	-16.8	3.1	3.9	6.5	9.6
1989	16.4	17.7	9.6	18.1	2.6	3.0	6.8	7.9
1990	17.8	23.5	0.9	33.0	2.1	1.0	6.1	4.6
1991	20.3	20.0	-13.4	-14.8	0.1	-0.7	3.3	3.3
1992	18.0	19.3	-10.0	-3.5	1.9	2.1	4.4	4.8
1993	18.8	17.0	-2.6	-11.9	2.6	3.0	3.8	3.5
1994	14.4	15.8	-15.3	-7.1	3.7	4.1	6.2	10.1
1995	17.0	17.1	7.6	8.2	3.2	2.0	8.6	9.2
1996	17.1	20.6	0.0	20.5	2.1	2.4	6.6	6.0
1997	20.6	19.1	0.0	-7.3	2.8	3.8	7.1	9.6
1998	15.3	12.7	-19.9	-33.5	2.5	3.9	6.0	4.2
1999	12.0	17.8	-5.5	40.2	2.7	4.1	4.1	6.4
2000	24.2	28.6	36.0	60.7	3.6	5.0	8.1	12.4
2001	24.4	25.0	-14.7	-12.6	1.6	1.2	7.6	0.1

Table B8: Oil prices, US GDP and world trade
- year ahead

	Oil price				US GDP		World imports	
	F	R	F	R	F	R	F	R
	USD/barrel		% change					
1969								
1970								
1971								
1972								
1973								
1974							5.0	5.5
1975	13.7	13.1	9.7	3.1	0.5	-1.8	7.0	-4.0
1976	13.8	13.7	1.5	4.6	5.0	6.3	5.0	11.0
1977	15.0	15.0	8.7	9.5	5.0	4.9	6.5	4.5
1978	15.5	12.9	3.3	-13.7	4.5	4.0	7.0	5.1
1979	15.8	19.2	5.3	48.3	2.8	2.3	4.8	6.6
1980	23.5	32.3	30.6	68.2	0.0	-0.2	3.7	1.9
1981	36.5	36.5	15.1	13.0	0.1	2.0	1.9	2.1
1982	37.2	33.9	4.4	-7.1	1.5	-1.7	4.3	-0.7
1983	33.1	29.9	-2.6	-11.8	2.0	3.3	2.1	1.9
1984	29.5	28.5	-2.3	-4.8	4.3	6.8	3.7	9.3
1985	28.5	27.5	0.0	-3.5	3.0	2.8	5.2	3.4
1986	26.0	13.7	-4.7	-50.1	2.5	2.9	4.8	4.9
1987	12.5	18.0	-12.9	31.0	2.3	3.4	4.4	6.1
1988	18.0	14.9	4.1	-16.8	2.7	4.4	3.9	9.5
1989	15.5	17.7	1.6	18.1	2.3	3.0	6.0	7.7
1990	17.2	23.5	1.2	33.0	2.0	0.9	6.1	3.5
1991	29.0	20.0	22.5	-14.8	0.3	-1.3	4.6	3.1
1992	20.5	19.3	2.5	-3.5	2.1	2.6	5.1	5.0
1993	19.4	17.0	0.0	-11.9	2.4	3.0	4.3	4.3
1994	16.6	15.8	-4.0	-7.1	2.6	4.1	5.5	10.4
1995	17.5	17.1	9.4	8.2	2.7	2.0	7.6	9.8
1996	17.2	20.6	1.2	20.5	2.3	2.8	8.0	7.7
1997	20.8	19.1	3.5	-7.3	2.3	4.0	7.0	10.2
1998	19.3	12.7	0.5	-33.5	2.2	4.3	7.4	6.0
1999	13.8	17.8	3.8	40.2	2.1	4.3	4.9	6.8
2000	21.5	28.6	25.7	60.7	2.8	4.2	6.3	1.8
2001	30.0	25.0	3.4	-12.6	3.3	0.3	8.6	-0.8

Notes on oil prices:
brent crude
year ahead annual % change forecast:
calculated on current
year forecast in Atumn

Notes on US GDP:
real annual % change

Notes on world imports, current year:
real annual % change
1974,1975(F): approximated
1974(R): approximated
1981(R): 82-I
1982(F): 82-I

Notes on world imports, year ahead:
real annual % change
1989-1997(R): The outturn data for
world import volumes are latest
available data. From 90-XI, first
settled estimates were dropped as
t+2 forecasts were added in the
published tables.
1975(F) World: 74-VIII

Table B9: Real GDP growth rate - current year

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969	5.1	6.0			5.5	8.0					6.8	8.1			6.5	5.0	4.5	7.0	4.5	5.0					6.0	6.9
1970	5.0	5.5			5.8	4.9					5.2	6.0			7.5	5.1	4.0	3.5	5.0	5.9					6.0	5.4
1971	3.9	4.2			3.4	2.8					5.4	5.0			3.8	1.4	1.3	0.7	4.0	4.2					4.1	3.3
1972	3.6	4.5			1.8	2.9					5.1	5.4			4.0	3.2	1.7	3.5	3.6	4.0					3.3	3.8
1973	5.2	5.9	6.5	4.9	5.9	5.3					6.0	6.0	5.8	7.0	5.2	5.9	5.5	7.4	4.5	4.7			6.0	5.8	5.8	5.6
1974	3.3	4.0	2.0	1.5	2.0	0.6					4.4	3.8	4.0	0.4	5.0	3.4	3.3	4.9	2.5	1.7			-1.4	0.3	2.4	1.9
1975	0.6	-1.3	1.5	-1.1	0.5	-3.5					0.5	-2.0	1.5	-1.5	-1.6	-3.7	-2.5	-7.7	1.1	-0.7			0.9	-1.6	0.4	-2.5
1976	3.7	3.0	5.2	4.8	6.0	5.7					6.0	5.2	3.2	3.5	1.6	5.6	4.2	3.0	4.0	3.5			2.4	1.8	4.5	4.6
1977	3.5	2.0	1.5	1.2	4.0	2.6					3.1	3.0	3.7	5.6	3.0	1.7	2.0	1.1	4.0	2.5			0.8	0.6	3.0	2.2
1978	2.6	2.3	1.1	0.9	2.7	3.1					2.9	3.3	6.0	6.0	2.2	2.6	1.8	3.2	2.2	2.9			2.7	3.3	2.6	3.0
1979	2.5	2.5	2.3	3.5	4.0	4.4					3.4	3.2	3.8	3.2	4.9	5.0	2.3	2.7	2.1	2.2			2.0	0.6	3.4	3.3
1980	1.4	1.1	-0.9	-0.8	2.5	1.9					2.2	1.8	0.9	0.9	3.9	4.0	1.9	0.4	0.7	0.9			-2.6	-1.4	1.5	1.5
1981	-0.7	-1.5	0.1	-0.9	-0.7	0.2	1.5	-0.3			0.5	0.5	1.9	3.4	-0.3	0.2	-1.8	-1.0	-0.6	-0.7			-2.6	-1.2	-0.6	-0.2
1982	0.5	1.9	2.9	3.0	1.0	-0.6	0.8	-0.2			2.2	1.8	2.2	1.4	1.8	-0.5	0.6	1.5	0.5	-1.4			1.3	1.0	1.5	0.6
1983	-0.7	-0.3	1.4	2.0	0.6	1.5	0.9	0.4			-0.8	0.7	0.5	-1.9	0.1	-0.2	-1.4	3.2	-0.4	1.4			2.4	3.8	0.5	1.4
1984	1.3	1.7	2.7	3.4	3.0	2.7	1.7	2.8			1.1	1.5	2.4	4.2	2.4	2.8	0.3	5.5	2.1	2.4			2.7	2.1	2.2	2.2
1985	1.6	1.3	2.9	3.8	2.5	2.5	1.9	2.1			1.1	1.3	2.9	2.1	2.6	2.3	1.2	2.1	2.0	2.3			3.5	3.3	2.3	2.3
1986	2.0	2.2	2.5	3.4	3.5	2.5	-0.4	1.3	2.7	3.0	2.3	2.4	3.2	0.5	2.7	2.7	2.2	2.3	1.7	2.1	3.9	4.3	2.6	2.4	2.7	2.5
1987	1.2	1.8	-0.2	-1.0	1.5	1.8	-0.7	-0.6	2.8	5.2	1.5	2.2	1.1	4.8	3.2	3.1	2.0	2.0	1.7	2.2	3.4	4.6	3.1	3.6	2.2	2.7
1988	2.0	4.0	-0.1	-0.2	2.1	3.5	1.6	3.5	4.3	5.0	2.3	3.2	1.7	3.8	3.1	3.9	1.9	5.0	1.5	2.6	3.6	4.0	3.1	3.7	2.6	3.6
1989	3.6	4.5	1.1	1.1	3.0	3.4	3.0	2.9	4.5	4.9	3.1	3.5	4.1	5.7	3.4	3.2	3.2	4.6	3.4	4.0	4.2	5.4	2.4	2.3	3.2	3.4
1990	3.0	3.7	2.0	1.6	3.7	4.7	1.6	0.1	3.8	3.7	3.2	2.8	4.6	5.2	3.1	2.0	3.7	3.7	3.5	3.3	4.0	4.0	1.6	0.6	3.0	2.7
1991	2.3	1.4	1.4	1.0	2.7	3.4	0.8	1.8	3.0	2.4	1.6	1.2	1.7	1.9	1.7	1.4	3.1	2.9	2.6	2.2	2.8	1.8	-2.2	-2.2	1.4	1.3
1992	1.6	0.7	2.4	1.1	2.0	1.5	2.0	1.3	2.5	1.0	1.9	1.3	2.2	3.5	1.5	0.9	2.9	1.8	1.2	1.7	2.3	1.1	0.6	-0.6	1.7	0.9
1993	-1.2	-1.3	0.1	1.1	-2.0	-1.2	0.8	-0.2	-0.4	-1.0	-0.7	-0.7	2.1	2.5	0.0	-0.7	1.0	0.3	-0.6	0.3	0.5	-1.2	1.5	1.9	-0.4	-0.3
1994	1.3	2.3	3.8	4.4	1.3	2.9	0.7	1.2	1.1	2.0	1.6	2.7	4.2	6.3	1.5	2.2	1.6	3.0	1.3	2.5	1.1	1.1	2.5	3.8	1.6	2.8
1995	2.7	1.9	3.3	2.6	3.0	1.9	1.6	2.0	3.1	3.0	3.1	2.2	6.9	8.6	3.3	3.0	3.3	3.2	3.2	2.4	3.0	2.5	3.1	2.4	3.1	2.5
1996	1.1	1.4	1.3	2.4	0.5	1.4	2.0	2.6	2.0	2.2	1.0	1.3	5.6	8.4	1.8	0.7	2.6	3.6	1.8	2.8	2.3	3.0	2.4	2.1	1.5	1.6
1997	2.3	2.7	3.0	2.9	2.3	2.2	3.1	3.5	2.8	3.4	2.3	2.4	7.2	10.0	1.2	1.5	3.7	4.1	3.1	3.3	3.2	3.7	2.8	3.5	2.4	2.7
1998	2.8	2.9	0.0	2.7	0.0	2.8	0.0	3.7	3.6	3.8	3.0	3.2	8.7	11.9	2.4	1.4	4.4	5.7	3.7	3.7	4.0	4.0	1.9	2.3	2.8	2.9
1999	1.9	2.3	1.7	1.4	1.7	1.5	3.4	3.5	3.3	3.7	2.3	2.8	9.3	8.3	1.6	1.4	3.2	5.0	2.3	3.5	3.2	2.9	1.1	2.0	2.1	2.3
2000	3.5	3.9	2.0	2.9	2.9	3.0	3.9	4.1	3.8	4.1	3.7	3.2	7.5	10.7	2.7	2.9	5.6	8.5	4.1	3.9	3.6	3.3	3.3	3.0	3.4	3.4
2001	3.0	1.0	2.1	0.9	2.2	0.6	4.4	4.1	3.2	2.8	2.9	2.0	7.5	6.8	2.5	1.8	5.6	5.1	3.4	1.1	2.6	1.8	2.7	2.2	2.8	1.7

Since 1974-VI: GDP, before GNP

1969(R) B, F: 69-XII; EU: CAL

1970(F) B: 69-XII; EU: CAL

1972(R) EU: idem for EUR9

1980(R) EU: 1.4 for EUR10

1985(R) EU: idem for EUR12

1994(R) EU: 2.7 for EUR15

Table B10: Real GDP growth rate - year ahead

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969																										
1970	5.0	6.1			4.4	5.4					3.6	6.0			7.6	5.1	3.0	3.5	4.0	5.5					4.7	5.5
1971	4.1	3.7			3.7	2.8					5.3	5.0			6.1	1.4	2.4	0.7	4.2	4.0					4.7	3.3
1972	4.2	5.4			1.0	3.0					5.0	5.4			3.5	3.2	2.0	3.5	2.0	4.5					3.0	3.9
1973	4.5	5.6			5.0	5.3					5.4	6.0			5.5	5.9	4.0	7.5	4.5	4.0					5.2	5.6
1974	6.0	2.0	3.5	1.6	3.5	0.6					5.1	3.8	5.6	0.4	6.5	3.4	3.3	4.5	3.0	2.8			3.5	0.7	4.5	2.0
1975	2.5	-2.0	1.5	-1.0	2.5	-3.3					3.0	-1.3	2.0	-0.5	1.4	-3.7	1.5	-7.7	2.4	-0.9			2.5	-1.3	2.5	-2.3
1976	3.0	3.0	4.0	4.8	3.5	5.7					5.0	5.2	2.0	3.2	3.0	5.6	3.9	2.7	2.8	4.4			0.1	1.6	3.1	4.7
1977	3.0	1.3	2.0	1.9	3.9	2.8					3.0	3.0	2.0	5.5	0.5	1.7	3.0	1.3	3.6	2.4			1.4	1.0	2.7	2.3
1978	3.1	2.5	2.0	0.9	4.0	3.2					3.6	3.3	5.5	6.1	3.3	2.6	2.8	3.2	3.1	2.4			2.5	3.7	3.4	3.1
1979	2.5	2.4	1.6	3.5	3.5	4.6					3.7	3.2	4.0	1.9	4.1	5.0	2.9	2.7	2.5	2.2			2.4	0.9	3.3	3.4
1980	2.5	2.4	0.8	-0.2	2.9	1.9					2.2	1.3	3.0	0.9	2.2	4.0	2.0	0.4	2.2	0.5			-1.0	-1.4	1.9	1.4
1981	0.9	-1.7	0.6	-0.2	1.0	0.1					1.2	0.3	2.5	1.1	0.2	-0.2	0.5	-2.4	0.3	-1.1			-0.6	-1.9	0.6	-0.4
1982	0.2	1.0	3.0	3.4	2.2	-1.0	2.1	0.0			3.0	1.8	3.6	1.2	1.8	-0.3	-0.3	-1.1	0.9	-1.6			1.2	1.5	2.0	0.4
1983	0.5	0.4	1.6	2.5	1.0	1.0	1.9	0.3			1.0	0.7	2.4	0.6	1.0	-1.2	1.0	-1.4	-0.3	0.6			1.7	3.3	1.1	0.9
1984	0.6	1.7	1.2	3.9	2.1	2.6	1.5	2.6			0.4	1.6	1.8	4.4	1.5	2.6	-1.0	3.2	0.0	1.7			2.2	1.8	1.5	2.2
1985	1.0	1.5	2.9	3.8	2.5	2.6	2.0	2.1			1.7	1.4	2.6	2.0	2.3	2.3	1.9	2.2	1.8	1.7			3.0	3.7	2.3	2.4
1986	1.7	2.3	3.2	3.4	3.5	2.6	1.0	1.3			1.9	2.0	2.3	-0.3	2.7	2.7	1.3	2.5	2.0	2.4			2.0	2.9	2.5	2.5
1987	1.3	1.8	1.8	-1.0	3.2	1.9	-0.2	-0.4	3.0	5.2	2.5	2.3	3.1	4.1	3.6	3.1	2.6	2.4	1.8	1.5	3.5	4.6	2.7	4.3	2.8	2.9
1988	1.8	4.0	0.9	-0.4	1.9	3.7	0.5	4.0	3.7	5.0	1.9	3.4	1.3	3.7	2.8	3.9	1.8	5.2	1.2	2.8	3.0	3.9	2.7	4.2	2.3	3.8
1989	2.2	4.0	1.7	1.3	2.5	3.3	2.1	2.6	3.9	4.9	2.8	3.6	3.2	5.9	3.2	3.2	2.4	6.1	2.3	4.0	3.6	5.4	2.6	2.2	2.8	3.3
1990	3.3	3.7	2.0	2.1	3.5	4.7	2.3	-0.3	4.0	3.7	3.2	2.8	4.6	5.7	3.0	2.0	3.3	0.9	3.0	3.9	4.6	4.0	2.1	0.8	3.1	2.8
1991	2.2	1.9	0.9	1.2	3.1	3.7	1.0	1.8	2.5	2.4	2.5	1.1	2.3	2.5	2.3	1.4	2.9	3.1	2.0	2.2	3.2	1.9	0.7	-2.2	2.2	1.4
1992	2.1	0.5	3.0	1.2	2.2	1.6	1.2	1.3	3.1	0.8	2.3	1.4	2.3	4.8	2.0	0.9	3.4	1.8	1.3	1.4	1.7	1.1	2.0	-0.5	2.2	1.0
1993	0.5	-1.7	1.8	1.4	0.0	-1.2	1.6	-0.5	1.0	-1.1	1.0	-1.0	2.1	4.0	0.8	-0.7	2.0	0.3	0.6	0.3	1.3	-1.2	1.4	2.0	0.8	-0.4
1994	0.5	2.2	2.6	4.4	0.5	2.9	0.9	1.5	1.1	2.0	1.0	2.7	3.3	6.7	1.6	2.2	2.0	4.4	0.9	2.7	1.4	1.1	2.5	3.8	1.3	2.8
1995	2.7	1.9	3.2	2.8	3.0	1.9	1.1	2.0	2.8	2.8	3.2	2.2	5.6	10.7	3.0	3.0	3.0	3.4	3.2	2.1	3.0	2.3	2.7	2.4	3.0	2.4
1996	2.2	1.5	2.6	2.7	2.4	1.4	1.9	2.6	2.9	2.3	2.4	1.5	5.6	8.6	3.0	0.7	3.3	3.0	2.5	3.3	3.1	3.3	2.7	2.3	2.6	1.8
1997	2.2	2.9	3.1	3.3	2.2	2.2	2.5	3.2	2.7	3.5	2.1	2.3	5.8	10.6	1.4	1.5	2.8	4.8	2.8	3.6	2.8	3.7	3.0	3.5	2.3	2.7
1998	2.9	2.9	2.9	2.7	2.9	2.2	3.3	3.7	3.1	4.0	3.0	3.2	6.6	8.9	2.0	1.3	3.9	5.0	3.2	3.7	3.5	3.5	2.6	2.1	2.8	2.6
1999	2.5	2.7	1.9	1.7	2.2	1.6	3.5	3.4	3.6	4.0	2.6	2.9	8.2	9.8	2.1	1.4	3.8	7.5	2.7	3.9	3.4	3.0	1.3	2.2	2.4	2.5
2000	2.7	4.0	1.9	3.2	2.6	3.0	3.8	4.3	3.6	4.1	2.9	3.1	6.9	11.5	2.2	2.9	5.3	9.5	3.2	3.5	3.3	3.4	3.4	2.9	3.0	3.3
2001	3.3	0.8	2.3	1.0	2.8	0.6	4.5	4.1	3.5	2.7	3.1	1.8	8.2	5.7	2.8	1.8	6.5	1.0	4.0	1.3	2.7	1.7	3.0	2.0	3.1	1.5

Since 1974-VI: GDP, before GNP
1970(R) EU: CAL
1972(F) EU: CAL
1972(R) DK, L: 73-VIII; EU: CAL
1974(F) DK, D, I: 73-VIII; EU: CAL
1972(R) EU: 3.7 for EUR9
1973(R) EU: 5.5 for EUR9
1980(R) EU: 1.5 for EUR10
1981(R) EU: -0.6 or EUR10
1985(R) EU: idem for EUR12
1986(R) EU: 2.6 for EUR12
1994(R) EU: idem for EUR15
1995(F) EU: in fact EUR16 (includes Norway)

Table B11: Inflation (private consumption deflator, annual change) - current year

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969	3.3	3.5			3.0	2.5					5.5	6.9			2.4	2.9	2.6	2.3	6.5	7.0					3.5	4.0
1970	4.5	3.5			3.8	3.8					5.1	5.2			5.2	4.8	4.8	4.6	4.0	3.5					4.5	4.4
1971	6.0	5.1			4.5	5.3					4.7	5.7			5.0	5.2	4.5	4.7	6.0	7.0					4.9	5.4
1972	4.7	5.4			5.0	5.8					5.5	5.6			5.5	5.9	4.3	5.2	7.0	8.0					5.3	5.9
1973	6.0	7.0	8.0	9.3	7.0	7.1					6.8	7.2	9.0	11.5	9.0	11.0	6.0	6.1	7.8	9.0			6.0	8.6	7.1	8.0
1974	11.3	12.5	14.0	15.3	8.5	7.3					13.3	12.8	15.0	17.3	18.0	19.6	9.0	9.5	12.0	10.3			14.5	14.6	12.8	12.1
1975	11.5	12.8	10.5	9.6	6.0	6.1					10.0	11.8	25.1	21.0	19.0	17.4	9.3	10.7	10.0	10.4			19.5	22.0	11.9	12.4
1976	10.3	8.8	9.1	8.5	5.0	4.4					10.5	9.8	17.0	18.0	20.5	17.5	9.5	9.8	9.5	9.3			15.5	15.2	11.0	9.9
1977	7.5	6.6	9.0	10.6	4.0	3.9					9.0	9.1	15.0	13.6	19.0	18.0	7.8	6.7	7.0	6.7			15.0	14.3	9.6	9.1
1978	5.0	4.0	9.0	9.4	3.3	2.6					9.0	8.8	7.0	8.0	13.0	12.7	3.5	3.1	4.8	4.6			8.2	8.6	7.2	7.1
1979	4.2	4.5	8.7	9.6	4.0	4.1					9.8	10.5	12.5	13.2	14.8	14.9	4.5	4.5	5.0	4.7			11.5	12.0	8.5	9.0
1980	7.0	6.3	12.5	11.0	5.5	5.4					13.2	13.5	19.5	18.2	19.6	20.3	6.7	6.3	6.5	6.9			20.3	15.5	12.3	12.4
1981	6.8	7.6	10.0	10.7	5.8	5.9	24.0	24.4			13.0	12.5	17.5	20.5	21.0	19.0	6.8	8.1	7.3	6.7			11.2	10.7	11.5	10.9
1982	10.2	8.8	10.1	9.8	4.7	5.3	24.0	21.1			13.3	10.9	18.5	17.1	15.0	16.8	12.0	10.0	5.8	5.7			9.5	8.1	10.2	8.8
1983	6.7	7.7	6.4	6.7	3.0	3.0	21.5	19.1			8.6	9.3	10.5	10.5	14.9	14.9	8.8	8.4	2.7	2.5			6.2	5.4	6.4	6.3
1984	6.6	6.3	5.3	6.6	2.9	2.6	19.0	18.1			7.5	7.3	9.0	8.3	11.3	11.1	7.7	6.7	3.0	3.0			5.2	5.1	6.6	6.3
1985	5.3	4.9	4.2	5.0	2.4	2.0	17.5	18.4			6.0	5.5	5.8	5.4	8.7	9.4	4.5	4.0	2.3	2.3			5.5	5.4	5.4	5.5
1986	1.2	1.3	2.4	3.6	0.0	-0.4	22.5	22.1	8.0	9.1	2.4	2.7	2.9	3.6	5.6	6.3	0.8	0.3	-0.1	0.0	12.0	11.7	3.9	3.7	3.5	3.4
1987	1.5	1.6	4.3	4.1	0.8	0.6	13.5	16.0	6.0	5.3	2.7	3.0	3.2	3.0	4.3	4.8	1.3	0.6	-0.9	-0.2	9.5	10.2	3.9	3.3	3.1	3.3
1988	1.4	1.2	4.8	5.1	1.0	1.3	14.1	13.5	4.3	5.1	2.7	2.7	2.5	2.2	4.8	4.9	1.7	1.4	0.8	0.8	7.8	9.6	3.4	5.0	3.2	3.6
1989	3.0	3.1	4.3	4.8	3.0	3.1	14.6	13.8	6.1	6.8	3.3	3.5	3.8	4.1	6.6	6.3	2.5	3.4	1.7	1.1	12.3	12.8	5.8	5.8	4.8	4.9
1990	3.2	3.5	2.5	2.6	2.8	2.5	17.0	20.5	6.6	6.4	2.9	3.0	3.0	2.6	5.5	6.2	3.5	3.8	2.3	2.6	11.7	13.6	6.6	7.2	4.7	5.0
1991	3.2	3.2	2.4	2.5	3.5	3.6	18.0	19.5	5.9	6.3	3.1	3.0	3.0	3.0	6.3	6.7	3.5	3.2	2.8	3.5	11.5	11.9	6.5	7.2	5.0	5.2
1992	3.1	2.4	2.2	1.9	3.9	4.1	16.0	14.9	6.3	6.2	3.0	2.4	3.8	2.6	5.2	5.4	2.8	2.8	3.5	3.3	9.0	9.7	5.3	4.8	4.6	4.5
1993	2.8	2.8	1.0	1.7	4.0	3.4	13.8	13.7	5.0	5.1	2.5	2.2	3.5	2.0	5.2	4.8	3.7	3.6	2.3	2.1	6.8	6.8	4.1	3.5	4.1	3.9
1994	2.6	2.4	2.0	1.7	3.0	2.7	10.2	10.9	4.8	5.1	1.8	1.8	2.8	3.0	3.9	4.7	2.9	2.2	2.3	2.2	5.6	5.1	3.5	2.5	3.3	3.2
1995	1.9	1.5	2.3	1.8	2.3	2.0	9.6	9.3	4.9	4.6	1.9	1.6	2.9	2.5	5.2	5.7	2.3	2.0	1.8	1.1	4.5	4.2	3.0	2.6	3.2	3.0
1996	2.0	2.0	1.8	2.1	1.6	1.9	8.3	8.3	3.6	3.6	1.8	1.8	2.3	1.7	4.1	4.4	1.7	1.9	1.9	2.0	3.1	3.1	2.7	2.8	2.6	2.7
1997	1.9	1.6	2.3	2.3	1.9	1.9	6.0	5.5	2.4	2.5	1.6	1.1	2.0	1.4	2.7	2.4	1.7	1.4	2.4	2.2	2.5	2.1	2.3	2.3	2.2	2.1
1998	1.3	1.0	2.1	1.9	1.7	1.0	4.5	4.7	2.2	2.0	1.0	0.4	3.3	2.5	2.1	2.4	1.6	1.0	2.3	1.9	2.2	2.8	2.3	1.9	1.9	1.5
1999	1.0	1.1	2.3	2.1	0.7	0.8	2.5	2.5	1.8	2.8	0.5	0.8	2.2	3.3	1.8	2.1	0.7	1.0	1.8	2.0	2.2	2.3	2.0	2.2	1.3	1.6
2000	1.5	2.5	2.4	3.1	1.5	1.4	2.5	3.0	2.5	3.6	1.2	1.2	4.0	5.9	2.3	2.9	2.0	3.1	2.4	2.8	2.2	2.8	2.1	0.8	1.9	1.9
2001	1.7	2.3	2.1	2.1	1.8	1.8	2.8	3.0	3.2	3.2	1.3	1.2	4.8	4.5	2.6	2.9	2.4	2.8	4.2	4.5	3.5	4.4	1.4	1.5	2.1	2.1

1969(F) EU: CAL
1969(R) B, F: 69-XII; EU: CAL
1970(F) B: 69-XII; EU: CAL
1972(R) EU: 5.8 or EUR9
1980(R) EU: 11.7 for EUR10
1984(F) EU: recalculated based on improved weighting scheme (originally 5.1)
1985(R) EU: 5.5 for EUR12
1994(R) EU: idem for EUR15

Table B12: Inflation (private consumption deflator, annual change) - year ahead

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969																										
1970	4.5	2.8			2.8	3.9					5.8	5.2			5.5	4.8	6.0	4.6	5.0	4.0					4.6	4.4
1971	5.8	5.6			3.4	5.1					4.2	5.7			5.0	5.2	4.5	4.7	6.0	8.0					3.9	5.4
1972	4.7	5.0			4.5	5.8					4.3	5.6			6.7	5.9	3.5	6.1	6.5	8.5					5.2	5.9
1973	4.6	7.0			5.5	7.0					5.6	7.2			8.5	11.0	4.3	6.1	8.5	9.0					6.3	8.2
1974	6.1	12.3	7.5	15.0	6.5	7.3					7.2	12.8	8.0	17.3	9.5	19.6	5.5	9.5	9.5	10.0			7.0	15.2	7.4	12.5
1975	11.7	12.1	14.0	8.8	6.5	6.1					13.0	11.8	17.0	21.3	16.0	17.4	7.5	10.7	10.5	10.5			17.5	23.1	12.5	12.6
1976	9.0	9.0	8.0	8.5	5.5	4.4					9.0	9.8	16.0	17.0	12.0	17.5	7.8	9.8	10.5	9.2			15.5	15.3	9.6	9.9
1977	8.0	6.6	8.5	10.1	4.0	3.8					8.3	9.1	15.0	13.9	20.0	18.0	8.0	6.7	7.5	6.8			14.0	14.2	9.8	9.0
1978	6.8	4.5	10.5	9.4	4.0	2.6					8.4	8.8	10.0	7.9	12.0	12.7	5.7	3.1	7.0	4.4			11.4	8.5	8.0	6.8
1979	4.1	3.5	7.0	9.7	3.0	3.9					8.5	10.5	14.5	12.2	11.5	14.9	4.3	4.5	4.8	4.6			9.5	12.1	7.0	8.6
1980	7.1	6.4	9.8	11.9	4.5	5.4					9.6	13.5	13.0	18.2	14.5	20.3	6.5	6.3	6.8	6.9			12.7	15.5	9.1	12.4
1981	5.5	9.1	10.0	10.7	4.0	6.0					10.7	12.5	12.8	19.6	15.3	19.0	5.6	8.1	6.8	6.5			14.0	10.9	10.4	11.3
1982	7.0	7.4	9.5	9.8	4.5	5.3	22.0	21.1			13.9	10.9	16.0	17.1	16.4	16.7	7.0	10.0	6.0	5.7			10.7	8.0	10.7	8.7
1983	8.5	6.8	7.0	6.7	3.6	2.9	21.0	19.0			8.9	9.3	13.0	9.7	15.0	15.1	9.0	8.4	4.5	2.9			6.9	5.1	8.8	6.2
1984	6.5	6.2	5.4	6.6	3.2	2.5	18.5	18.1			7.2	7.3	8.8	8.5	11.5	11.1	7.7	6.7	3.6	2.6			5.8	5.1	6.8	6.2
1985	5.5	4.8	4.3	5.0	2.2	2.1	18.0	18.4			5.7	5.5	7.0	4.2	7.1	9.4	5.5	4.0	2.3	2.6			5.6	5.3	5.2	5.5
1986	3.2	1.3	1.7	3.6	1.5	-0.5	16.0	22.1			4.0	2.7	5.3	3.6	6.5	6.3	3.5	0.3	1.1	0.1			4.3	3.6	3.9	3.0
1987	1.5	1.6	2.8	4.1	1.1	0.5	12.5	15.8	5.3	5.3	2.3	3.0	3.2	3.1	4.0	4.8	1.3	0.6	-1.0	-0.4	9.0	10.2	3.9	3.8	3.0	3.3
1988	2.5	1.2	4.0	4.9	1.8	1.1	12.0	13.9	4.2	5.1	2.6	2.7	3.2	2.5	4.9	4.9	2.3	1.5	1.0	0.8	6.5	9.6	3.9	5.0	3.4	3.6
1989	2.4	3.4	3.7	5.0	2.5	3.2	12.8	14.4	4.3	6.6	2.7	3.5	2.8	3.9	4.6	6.0	2.2	4.0	1.3	2.1	7.0	12.8	4.7	6.1	3.7	4.9
1990	3.5	3.5	3.0	2.5	2.7	2.6	15.0	20.2	6.3	6.4	2.7	3.0	4.0	2.6	6.0	6.2	3.1	4.2	2.3	2.5	11.3	13.6	5.5	8.4	4.5	5.2
1991	4.5	2.9	3.3	2.4	3.9	3.9	18.5	18.4	6.6	6.3	3.6	3.0	3.5	3.2	6.3	6.8	4.0	2.9	2.8	3.3	12.6	11.9	6.3	7.2	5.3	5.3
1992	3.4	2.4	2.2	1.9	4.2	4.0	14.3	14.9	5.6	6.4	2.9	2.4	3.0	2.6	5.2	5.4	3.7	2.8	3.5	3.0	9.5	9.7	4.6	4.7	4.5	4.4
1993	2.8	2.6	1.6	1.7	3.6	3.3	13.5	13.6	5.5	5.6	2.7	2.2	2.2	1.6	5.8	5.1	4.7	3.6	2.7	2.1	6.8	7.9	5.1	3.5	4.4	3.9
1994	3.2	3.0	2.6	1.0	3.2	2.7	11.1	10.8	4.4	5.1	2.2	1.8	3.5	2.7	4.0	4.8	3.2	2.6	2.5	2.4	5.6	5.5	3.6	2.4	3.5	3.3
1995	2.5	1.6	2.1	2.1	2.2	1.9	9.5	9.3	4.5	4.7	1.9	1.6	2.7	2.0	3.5	5.8	2.5	2.0	2.4	0.9	4.6	4.2	2.9	2.6	2.9	3.0
1996	2.4	2.3	2.4	2.1	2.1	1.8	7.9	8.5	3.9	3.4	2.1	1.8	2.3	1.1	4.3	4.3	2.2	1.4	1.8	1.3	3.6	3.3	3.0	2.6	3.0	2.6
1997	2.1	1.6	2.4	2.2	1.7	1.8	6.9	5.5	2.9	2.5	1.4	1.1	2.2	0.9	2.9	2.5	2.1	1.1	2.0	2.0	3.0	2.5	2.4	2.6	2.2	2.1
1998	1.8	0.7	2.5	1.8	2.2	0.9	4.5	4.7	2.2	2.0	1.5	0.4	2.5	3.7	2.2	2.3	1.7	1.7	2.4	1.8	2.1	2.9	2.4	2.1	2.2	1.6
1999	1.4	1.2	2.4	2.6	1.1	0.3	2.9	2.4	2.1	2.5	1.2	0.8	3.3	3.3	2.0	2.2	1.7	1.4	2.3	1.9	2.4	2.5	2.2	2.0	1.7	1.4
2000	1.3	2.2	2.4	3.1	1.3	1.4	2.2	3.1	2.2	3.2	1.2	1.2	3.1	4.7	1.9	2.9	1.2	2.8	2.4	2.8	2.5	2.8	1.9	0.6	1.7	1.9
2001	1.9	2.5	2.6	2.1	1.6	1.9	2.8	3.1	3.0	3.3	1.5	1.2	4.0	4.2	2.4	2.9	2.6	2.8	4.0	4.6	2.9	4.2	2.0	0.4	2.1	2.0

1970(R) EU: CAL
1972(F) EU: CAL
1972(R) DK, D, I: 73-VIII; EU: CAL
1974(F) DK, D, I: 73-VIII; EU: CAL
1984(F) EU: recalculated based on improved weighting scheme (originally 5.6)
1985(F) EU: recalculated based on improved weighting scheme (originally 4.2)
1972(R) EU: 6.1 for EUR9
1973(R) EU: idem for EUR9
1980(R) EU: 11.9 for EUR10
1981(R) EU: 11.8 for EUR10
1985(R) EU: 5.8 for EUR12
1986(R) EU: 3.7 for EUR12
1994(R) EU: 3.2 for EUR15
1995(F) EU: in fact EUR16 (includes Norway)

Table B13: Exports (goods only, real annual change) - current year

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969	12.7	16.5			7.0	12.1					11.9	16.6	0.0	0.0	14.7	11.0	9.0	13.0	11.0	16.0					10.5	13.7
1970	9.5	11.5			8.6	8.4					13.9	15.9	0.0	0.0	9.6	7.2	6.0	1.5	13.5	14.0					10.4	10.5
1971	8.5	7.3			6.5	6.8					8.0	10.1	0.0	0.0	7.9	6.5	1.5	-4.0	9.0	11.0					7.6	7.9
1972	4.7	10.5			5.8	8.6					8.6	9.6	0.0	0.0	8.5	13.3	1.2	4.0	6.5	12.5					6.8	10.4
1973	9.3	13.0	10.0	6.5	14.0	17.9					13.7	10.8	15.4	12.3	11.2	5.3	8.0	10.4	11.0	13.5			11.0	11.5	12.1	12.4
1974	7.1	2.2	6.0	6.0	8.5	15.1					9.4	9.5	9.8	5.7	12.0	6.3	5.0	5.0	5.5	4.4			9.8	7.0	8.9	8.7
1975	1.0	-8.4	2.0	-3.1	-2.0	-10.8					3.0	-3.7	1.8	8.0	5.0	3.7	-8.0	-16.0	0.8	-4.8			2.5	-4.0	1.3	-5.1
1976	7.0	8.3	6.0	2.0	12.0	11.8					9.0	10.6	3.0	10.5	10.0	11.1	8.0	3.0	8.0	12.5			8.7	7.7	9.5	10.2
1977	6.4	0.6	6.5	2.6	7.0	4.2					8.7	5.6	9.0	15.5	9.0	6.4	3.0	1.3	6.5	-2.0			7.7	7.2	7.6	4.5
1978	3.5	3.7	3.5	2.8	6.0	3.6					5.0	6.6	11.0	14.0	5.5	11.0	3.2	4.6	3.3	3.0			4.0	3.4	4.3	5.0
1979	3.7	5.0	5.0	10.0	5.5	6.3					6.2	7.3	9.0	7.2	6.1	7.2	2.9	4.4	5.0	9.6			4.8	3.6	5.4	6.5
1980	2.8	3.2	4.5	7.2	5.5	5.1					4.0	3.0	5.8	6.0	3.8	-4.8	3.1	-2.0	2.0	0.7			2.9	1.7	4.0	1.8
1981	-2.0	1.5	1.3	4.1	2.5	8.1	1.5	-3.5			0.4	5.4	1.0	3.0	4.0	5.9	-6.0	-12.0	0.8	1.1			-6.7	-4.5	0.1	3.5
1982	5.0	2.0	5.6	2.0	6.8	3.7	4.4	-4.2			3.4	-4.4	8.5	5.1	5.3	0.8	3.6	-0.1	4.0	-0.9			1.5	1.8	4.6	0.8
1983	1.5	2.5	2.0	7.1	0.3	-0.4	2.0	18.9			0.4	4.7	7.5	12.4	-1.6	3.8	-1.0	-2.1	0.0	5.8			1.8	5.8	0.5	0.8
1984	5.5	7.5	4.2	5.1	9.5	9.2	5.5	12.2			5.3	7.2	11.0	16.8	5.6	7.4	3.2	12.2	6.0	6.1			6.3	7.6	6.9	7.9
1985	4.6	2.5	5.8	3.9	8.0	7.9	6.3	-0.1			4.9	2.9	10.9	6.7	4.0	7.3	1.3	4.2	4.7	5.2			8.8	5.5	6.4	5.6
1986	4.1	5.0	2.9	0.1	3.1	-0.4	7.0	16.9	1.3	-3.5	2.0	0.3	4.5	1.9	4.0	5.0	1.7	2.0	2.0	2.7	3.8	9.0	2.5	3.7	2.9	2.1
1987	3.4	4.8	0.5	3.0	-1.0	1.0	3.5	0.9	2.5	7.0	2.7	2.5	4.5	13.8	2.2	3.0	0.8	1.0	2.0	5.9	5.3	10.0	5.3	5.8	2.2	3.8
1988	4.8	9.6	2.8	5.8	2.8	6.1	1.0	6.1	6.0	8.0	3.5	7.4	9.1	10.8	4.0	5.9	3.4	9.0	3.5	8.6	6.5	7.8	2.5	-0.6	3.6	5.8
1989	7.9	8.5	5.2	6.1	7.5	10.0	4.6	4.0	6.1	8.8	6.9	8.1	6.6	11.8	6.0	9.1	5.9	8.3	6.6	5.4	9.0	21.2	3.5	5.5	6.3	8.3
1990	6.2	4.8	4.9	6.6	9.2	0.6	5.5	-2.9	6.8	8.3	5.9	5.4	6.9	5.4	5.6	4.2	5.6	2.0	5.2	5.5	9.5	12.0	8.1	6.8	7.1	4.4
1991	3.7	3.5	4.1	5.8	-2.8	10.9	4.2	14.6	6.4	11.2	4.1	4.3	4.6	5.1	3.0	0.9	2.5	2.3	4.6	4.3	4.9	-0.1	1.9	1.7	2.1	5.5
1992	3.7	0.2	5.0	5.1	5.1	5.3	4.0	7.2	8.0	7.0	4.9	4.9	6.4	12.6	2.7	4.3	2.6	0.2	3.4	2.4	6.0	5.5	4.2	2.8	4.5	4.3
1993	-0.7	-3.5	-1.6	0.3	-2.9	-9.9	3.1	2.6	5.1	11.5	-1.3	-1.3	2.5	4.2	6.3	8.4	0.5	-5.0	0.1	0.3	0.4	-4.0	6.4	3.0	1.0	-0.9
1994	3.5	7.0	4.1	6.8	6.2	8.9	4.1	6.6	10.3	20.7	4.5	6.6	5.3	11.5	6.8	10.5	2.0	6.2	3.8	6.2	6.6	12.3	4.8	10.6	5.5	9.4
1995	6.1	7.8	5.3	-0.9	6.8	4.1	5.2	3.5	12.7	9.9	6.4	7.6	8.9	15.0	11.4	10.9	5.5	3.0	5.3	6.3	10.7	12.4	8.2	6.3	7.9	7.3
1996	2.9	3.7	2.7	1.9	3.2	4.5	4.1	2.5	5.9	10.6	2.7	3.8	9.8	10.4	4.6	-0.3	1.0	-0.7	3.5	4.1	10.0	10.5	5.1	6.9	4.1	4.5
1997	5.8	6.4	4.5	6.5	7.6	11.5	3.8	3.8	9.5	13.3	6.3	11.7	10.7	15.3	3.7	4.1	3.0	5.7	6.0	5.8	8.0	9.5	4.9	8.0	6.2	9.3
1998	5.9	3.1	6.2	1.2	8.3	5.9	7.0	5.0	11.1	6.0	6.7	6.7	13.4	20.4	7.3	1.8	6.5	7.5	7.4	6.6	10.9	8.7	2.0	1.0	7.1	5.1
1999	3.0	2.9	3.2	3.8	3.0	4.9	4.0	3.8	4.3	6.7	3.0	4.5	14.6	13.0	1.1	-1.0	3.8	5.0	4.0	4.8	6.1	4.5	2.4	2.2	3.4	4.0
2000	7.2	10.6	5.5	8.3	10.0	13.9	6.1	8.5	10.0	11.0	8.5	14.0	12.0	15.9	8.1	9.7	7.6	9.5	7.2	9.1	8.0	7.8	7.5	10.4	8.6	11.8
2001	7.2	-0.4	6.7	1.1	10.7	5.3	8.3	1.3	9.1	2.0	9.5	0.1	10.0	6.2	7.6	0.2	6.8	4.5	7.1	1.0	7.1	3.4	7.0	2.1	8.6	2.0

1969-1973(F,R): occasionally goods and services when goods only were not available
1969-1977(F,R) EU: CAL
1981(R): 82-I
1982(F): 82-I
1972(R) EU: 8.1 for EUR9
1980(R) EU: 2.3 for EUR10
1985(R) EU: 5.7 for EUR12
1994(R) EU: 9.6 for EUR15
EU: includes intra trade

Table B14: Exports (goods only, real annual change) - year ahead

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969																										
1970	9.5	11.7			7.8	9.0					12.0	15.8			9.9	3.5	6.5	1.5	8.5	14.5					9.2	10.2
1971	9.3	9.1			6.9	6.9					8.5	11.7			11.2	6.5	2.2	-4.0	10.6	10.6					8.7	8.4
1972	6.9	9.4			5.0	8.5					8.1	11.8			4.8	13.2	2.5	5.0	5.5	12.5					5.9	10.7
1973	9.9	13.2			8.0	19.8					12.8	10.8			10.0	6.8	5.2	13.1	10.0	14.0					9.9	13.9
1974	9.8	7.7	8.0	5.5	10.0	14.7					11.0	9.5	14.3	2.0	15.5	8.3	3.0	5.3	5.0	2.6			7.0	6.8	9.8	9.1
1975	5.5	-11.1	5.0	-3.0	5.5	-10.4					6.9	-4.3	6.5	8.0	8.0	3.7	0.0	-12.8	4.8	-4.8			5.2	-4.0	5.9	-5.3
1976	5.0	8.3	5.5	1.9	5.0	12.9					5.3	10.3	5.0	10.5	6.0	12.2	6.0	3.0	6.0	12.5			5.5	7.7	5.4	10.6
1977	7.5	1.2	6.5	1.8	8.0	4.4					8.0	6.2	7.0	13.5	8.5	6.4	5.0	0.0	7.0	-1.9			7.4	7.2	7.8	4.7
1978	6.0	4.5	6.0	4.4	5.5	3.6					7.1	6.6	9.0	12.9	8.0	11.0	3.5	4.6	7.0	3.0			7.3	3.4	6.5	5.1
1979	3.6	5.9	4.5	10.0	4.0	6.3					5.3	7.3	12.0	7.1	5.5	7.2	3.8	4.4	4.0	10.0			5.0	3.6	4.6	6.6
1980	3.5	2.8	3.9	7.1	4.5	5.4					4.2	3.0	8.0	6.0	4.3	-4.8	2.0	-2.0	4.0	1.2			3.5	1.7	4.2	1.9
1981	1.5	1.4	3.0	4.5	3.0	7.9					2.6	4.9	5.3	2.4	1.8	7.3	0.8	-12.0	1.5	-0.2			0.5	-1.1	2.1	4.1
1982	4.8	1.4	5.5	2.0	8.5	3.7	7.0	-3.8			5.9	-4.4	9.5	5.1	4.0	0.8	3.5	-0.1	5.0	-0.8			1.6	1.8	5.9	0.8
1983	3.5	-0.2	3.2	7.1	2.5	-0.5	3.8	18.9			3.0	4.8	7.5	12.2	3.2	5.4	2.8	-2.1	2.8	6.3			1.0	0.8	2.7	2.6
1984	3.0	4.9	2.0	5.1	3.4	8.3	2.2	12.2			3.3	7.4	9.0	18.6	4.6	7.4	0.0	14.8	4.0	6.8			2.7	8.2	3.5	7.7
1985	4.5	2.2	5.3	3.9	7.5	7.9	5.7	-0.1			5.9	2.8	10.3	6.4	4.7	7.3	3.7	6.4	5.5	5.1			5.5	5.4	6.0	5.5
1986	4.8	5.0	5.0	0.1	6.5	-0.4	6.5	16.9			3.8	-0.3	7.8	3.8	6.4	5.0	1.2	2.7	4.5	0.8			1.2	3.7	4.8	1.9
1987	4.2	4.8	3.1	3.0	3.0	0.9	5.0	1.9	2.5	7.0	4.0	2.5	5.0	13.6	4.0	3.2	3.2	2.0	4.5	3.9	4.0	10.0	3.5	5.2	3.7	3.5
1988	3.5	9.2	2.0	6.0	2.0	6.2	3.5	6.1	4.0	8.0	4.0	7.9	6.1	8.9	3.8	5.9	1.9	9.0	3.5	8.2	6.5	7.8	2.9	1.4	3.3	6.2
1989	6.1	7.0	4.1	6.5	5.0	9.7	3.5	3.8	5.8	8.8	7.1	8.8	7.8	10.5	6.5	9.1	4.6	7.7	4.6	5.2	6.5	21.2	3.9	4.9	5.5	8.0
1990	6.1	5.8	5.3	6.9	7.2	7.0	4.0	-6.9	5.4	8.3	7.0	5.4	9.3	5.8	5.0	4.2	5.5	1.5	5.9	5.2	11.0	12.0	8.2	6.6	6.7	6.0
1991	4.8	2.4	4.2	5.9	9.2	11.7	4.5	14.6	5.1	11.2	4.4	4.6	6.1	5.0	3.9	0.9	3.3	2.9	4.6	5.1	8.4	-0.2	1.6	1.7	5.3	5.7
1992	4.8	0.2	7.0	5.5	6.1	5.3	4.1	7.2	7.4	6.1	5.1	5.0	6.0	14.4	4.0	4.3	3.3	0.2	4.9	2.2	3.9	5.5	5.8	2.2	5.4	4.2
1993	0.9	2.0	2.1	0.8	1.5	-9.5	5.0	0.0	6.2	11.5	2.4	-1.0	3.2	10.3	6.1	8.4	0.9	-5.0	2.4	0.9	2.9	-6.6	7.9	3.2	3.7	-0.2
1994	1.7	7.8	2.6	8.2	2.9	9.2	5.1	3.0	7.5	20.7	3.5	6.5	4.5	14.9	5.6	10.9	1.1	7.1	3.1	6.8	4.2	14.9	3.4	9.9	3.7	9.6
1995	6.5	10.0	5.5	0.7	8.1	6.3	5.0	3.5	12.2	9.6	6.6	7.5	8.2	18.2	7.4	10.9	5.0	3.8	5.6	8.2	12.9	12.5	7.0	7.3	7.5	8.2
1996	5.5	3.3	5.2	1.5	5.3	4.5	5.5	-0.7	6.3	12.0	5.5	5.0	8.5	10.0	8.8	-0.3	4.4	-0.8	6.4	4.6	12.8	11.5	7.0	6.7	6.6	4.8
1997	5.5	6.1	4.5	5.7	6.0	11.5	4.3	5.1	8.2	16.1	5.2	12.3	8.7	17.5	5.3	5.1	3.7	5.7	5.9	6.5	7.2	9.8	6.6	8.2	6.0	9.9
1998	7.3	3.3	6.9	1.3	9.6	7.5	5.4	1.7	9.8	5.1	7.6	6.7	11.5	21.4	6.9	1.7	3.6	14.1	7.8	6.5	9.4	7.9	3.4	1.0	7.7	5.5
1999	4.6	5.0	3.2	6.8	3.8	5.3	3.7	2.3	6.6	5.0	3.5	3.7	12.1	11.7	4.6	-1.0	4.8	-2.0	4.8	5.6	6.9	0.0	3.9	3.1	4.7	4.2
2000	5.5	9.1	4.8	10.5	7.1	13.5	5.1	11.8	9.0	9.2	5.6	13.1	9.8	17.6	4.9	9.7	5.0	14.8	5.9	10.0	6.8	0.0	7.6	11.3	6.6	11.8
2001	8.2	-0.4	7.0	1.1	9.9	5.3	7.2	1.3	10.0	2.0	8.7	0.1	12.0	6.2	9.2	0.2	9.0	4.5	8.3	1.0	8.0	3.4	7.5	2.1	9.0	2.0

1970-1973(F,R): occasionally goods and services when goods only were not available
1970-1977(F,R) EU: CAL
1995(F) EU: in fact EUR16
EU: includes intra trade
1972(R) EU: 8.5 for EUR9
1973(R) EU: 13.4 idem for EUR9
1980(R) EU: 2.4 for EUR10
1981(R) EU: 4.0 EUR10
1985(R) EU: 5.6 for EUR12
1986(R) EU: 2.0 for EUR12
1994(R) EU: 9.9 for EUR15

Table B15: Import prices (goods only, annual change) - current year

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969	12.7	16.5			7.0	12.1					11.9	16.6	0.0	0.0	14.7	11.0	9.0	13.0	11.0	16.0					10.5	13.7
1970	9.5	11.5			8.6	8.4					13.9	15.9	0.0	0.0	9.6	7.2	6.0	1.5	13.5	14.0					10.4	10.5
1971	8.5	7.3			6.5	6.8					8.0	10.1	0.0	0.0	7.9	6.5	1.5	-4.0	9.0	11.0					7.6	7.9
1972	4.7	10.5			5.8	8.6					8.6	9.6	0.0	0.0	8.5	13.3	1.2	4.0	6.5	12.5					6.8	10.4
1973	9.3	13.0	10.0	6.5	14.0	17.9					13.7	10.8	15.4	12.3	11.2	5.3	8.0	10.4	11.0	13.5			11.0	11.5	12.1	12.4
1974	7.1	2.2	6.0	6.0	8.5	15.1					9.4	9.5	9.8	5.7	12.0	6.3	5.0	5.0	5.5	4.4			9.8	7.0	8.9	8.7
1975	1.0	-8.4	2.0	-3.1	-2.0	-10.8					3.0	-3.7	1.8	8.0	5.0	3.7	-8.0	-16.0	0.8	-4.8			2.5	-4.0	1.3	-5.1
1976	7.0	8.3	6.0	2.0	12.0	11.8					9.0	10.6	3.0	10.5	10.0	11.1	8.0	3.0	8.0	12.5			8.7	7.7	9.5	10.2
1977	6.4	0.6	6.5	2.6	7.0	4.2					8.7	5.6	9.0	15.5	9.0	6.4	3.0	1.3	6.5	-2.0			7.7	7.2	7.6	4.5
1978	3.5	3.7	3.5	2.8	6.0	3.6					5.0	6.6	11.0	14.0	5.5	11.0	3.2	4.6	3.3	3.0			4.0	3.4	4.3	5.0
1979	3.7	5.0	5.0	10.0	5.5	6.3					6.2	7.3	9.0	7.2	6.1	7.2	2.9	4.4	5.0	9.6			4.8	3.6	5.4	6.5
1980	2.8	3.2	4.5	7.2	5.5	5.1					4.0	3.0	5.8	6.0	3.8	-4.8	3.1	-2.0	2.0	0.7			2.9	1.7	4.0	1.8
1981	-2.0	1.5	1.3	4.1	2.5	8.1	1.5	-3.5			0.4	5.4	1.0	3.0	4.0	5.9	-6.0	-12.0	0.8	1.1			-6.7	-4.5	0.1	3.5
1982	5.0	2.0	5.6	2.0	6.8	3.7	4.4	-4.2			3.4	-4.4	8.5	5.1	5.3	0.8	3.6	-0.1	4.0	-0.9			1.5	1.8	4.6	0.8
1983	1.5	2.5	2.0	7.1	0.3	-0.4	2.0	18.9			0.4	4.7	7.5	12.4	-1.6	3.8	-1.0	-2.1	0.0	5.8			1.8	5.8	0.5	0.8
1984	5.5	7.5	4.2	5.1	9.5	9.2	5.5	12.2			5.3	7.2	11.0	16.8	5.6	7.4	3.2	12.2	6.0	6.1			6.3	7.6	6.9	7.9
1985	4.6	2.5	5.8	3.9	8.0	7.9	6.3	-0.1			4.9	2.9	10.9	6.7	4.0	7.3	1.3	4.2	4.7	5.2			8.8	5.5	6.4	5.6
1986	4.1	5.0	2.9	0.1	3.1	-0.4	7.0	16.9	1.3	-3.5	2.0	0.3	4.5	1.9	4.0	5.0	1.7	2.0	2.0	2.7	3.8	9.0	2.5	3.7	2.9	2.1
1987	3.4	4.8	0.5	3.0	-1.0	1.0	3.5	0.9	2.5	7.0	2.7	2.5	4.5	13.8	2.2	3.0	0.8	1.0	2.0	5.9	5.3	10.0	5.3	5.8	2.2	3.8
1988	4.8	9.6	2.8	5.8	2.8	6.1	1.0	6.1	6.0	8.0	3.5	7.4	9.1	10.8	4.0	5.9	3.4	9.0	3.5	8.6	6.5	7.8	2.5	-0.6	3.6	5.8
1989	7.9	8.5	5.2	6.1	7.5	10.0	4.6	4.0	6.1	8.8	6.9	8.1	6.6	11.8	6.0	9.1	5.9	8.3	6.6	5.4	9.0	21.2	3.5	5.5	6.3	8.3
1990	6.2	4.8	4.9	6.6	9.2	0.6	5.5	-2.9	6.8	8.3	5.9	5.4	6.9	5.4	5.6	4.2	5.6	2.0	5.2	5.5	9.5	12.0	8.1	6.8	7.1	4.4
1991	3.7	3.5	4.1	5.8	-2.8	10.9	4.2	14.6	6.4	11.2	4.1	4.3	4.6	5.1	3.0	0.9	2.5	2.3	4.6	4.3	4.9	-0.1	1.9	1.7	2.1	5.5
1992	3.7	0.2	5.0	5.1	5.1	5.3	4.0	7.2	8.0	7.0	4.9	4.9	6.4	12.6	2.7	4.3	2.6	0.2	3.4	2.4	6.0	5.5	4.2	2.8	4.5	4.3
1993	-0.7	-3.5	-1.6	0.3	-2.9	-9.9	3.1	2.6	5.1	11.5	-1.3	-1.3	2.5	4.2	6.3	8.4	0.5	-5.0	0.1	0.3	0.4	-4.0	6.4	3.0	1.0	-0.9
1994	3.5	7.0	4.1	6.8	6.2	8.9	4.1	6.6	10.3	20.7	4.5	6.6	5.3	11.5	6.8	10.5	2.0	6.2	3.8	6.2	6.6	12.3	4.8	10.6	5.5	9.4
1995	6.1	7.8	5.3	-0.9	6.8	4.1	5.2	3.5	12.7	9.9	6.4	7.6	8.9	15.0	11.4	10.9	5.5	3.0	5.3	6.3	10.7	12.4	8.2	6.3	7.9	7.3
1996	2.9	3.7	2.7	1.9	3.2	4.5	4.1	2.5	5.9	10.6	2.7	3.8	9.8	10.4	4.6	-0.3	1.0	-0.7	3.5	4.1	10.0	10.5	5.1	6.9	4.1	4.5
1997	5.8	6.4	4.5	6.5	7.6	11.5	3.8	3.8	9.5	13.3	6.3	11.7	10.7	15.3	3.7	4.1	3.0	5.7	6.0	5.8	8.0	9.5	4.9	8.0	6.2	9.3
1998	5.9	3.1	6.2	1.2	8.3	5.9	7.0	5.0	11.1	6.0	6.7	6.7	13.4	20.4	7.3	1.8	6.5	7.5	7.4	6.6	10.9	8.7	2.0	1.0	7.1	5.1
1999	3.0	2.9	3.2	3.8	3.0	4.9	4.0	3.8	4.3	6.7	3.0	4.5	14.6	13.0	1.1	-1.0	3.8	5.0	4.0	4.8	6.1	4.5	2.4	2.2	3.4	4.0
2000	7.2	10.6	5.5	8.3	10.0	13.9	6.1	8.5	10.0	11.0	8.5	14.0	12.0	15.9	8.1	9.7	7.6	9.5	7.2	9.1	8.0	7.8	7.5	10.4	8.6	11.8
2001	7.2	-0.4	6.7	1.1	10.7	5.3	8.3	1.3	9.1	2.0	9.5	0.1	10.0	6.2	7.6	0.2	6.8	4.5	7.1	1.0	7.1	3.4	7.0	2.1	8.6	2.0

1969-1973(F,R): occasionally goods and services when goods only were not available

1969-1977(F,R) EU: CAL

1981(R): 82-I

1982(F): 82-I

1972(R) EU: 1.5 for EUR9

1980(R) EU: 13.9 for EUR10

1985(R) EU: 2.4 for EUR12

1994(R) EU: 1.9 for EUR15

Table B16: import prices (goods only, annual change) - year ahead

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		Luxembourg		Netherlands		Portugal		Un. Kingd.		Eur. Union	
	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R
1969																										
1970	9.5	11.7			7.8	9.0					12.0	15.8			9.9	3.5	6.5	1.5	8.5	14.5					9.2	10.2
1971	9.3	9.1			6.9	6.9					8.5	11.7			11.2	6.5	2.2	-4.0	10.6	10.6					8.7	8.4
1972	6.9	9.4			5.0	8.5					8.1	11.8			4.8	13.2	2.5	5.0	5.5	12.5					5.9	10.7
1973	9.9	13.2			8.0	19.8					12.8	10.8			10.0	6.8	5.2	13.1	10.0	14.0					9.9	13.9
1974	9.8	7.7	8.0	5.5	10.0	14.7					11.0	9.5	14.3	2.0	15.5	8.3	3.0	5.3	5.0	2.6			7.0	6.8	9.8	9.1
1975	5.5	-11.1	5.0	-3.0	5.5	-10.4					6.9	-4.3	6.5	8.0	8.0	3.7	0.0	-12.8	4.8	-4.8			5.2	-4.0	5.9	-5.3
1976	5.0	8.3	5.5	1.9	5.0	12.9					5.3	10.3	5.0	10.5	6.0	12.2	6.0	3.0	6.0	12.5			5.5	7.7	5.4	10.6
1977	7.5	1.2	6.5	1.8	8.0	4.4					8.0	6.2	7.0	13.5	8.5	6.4	5.0	0.0	7.0	-1.9			7.4	7.2	7.8	4.7
1978	6.0	4.5	6.0	4.4	5.5	3.6					7.1	6.6	9.0	12.9	8.0	11.0	3.5	4.6	7.0	3.0			7.3	3.4	6.5	5.1
1979	3.6	5.9	4.5	10.0	4.0	6.3					5.3	7.3	12.0	7.1	5.5	7.2	3.8	4.4	4.0	10.0			5.0	3.6	4.6	6.6
1980	3.5	2.8	3.9	7.1	4.5	5.4					4.2	3.0	8.0	6.0	4.3	-4.8	2.0	-2.0	4.0	1.2			3.5	1.7	4.2	1.9
1981	1.5	1.4	3.0	4.5	3.0	7.9					2.6	4.9	5.3	2.4	1.8	7.3	0.8	-12.0	1.5	-0.2			0.5	-1.1	2.1	4.1
1982	4.8	1.4	5.5	2.0	8.5	3.7	7.0	-3.8			5.9	-4.4	9.5	5.1	4.0	0.8	3.5	-0.1	5.0	-0.8			1.6	1.8	5.9	0.8
1983	3.5	-0.2	3.2	7.1	2.5	-0.5	3.8	18.9			3.0	4.8	7.5	12.2	3.2	5.4	2.8	-2.1	2.8	6.3			1.0	0.8	2.7	2.6
1984	3.0	4.9	2.0	5.1	3.4	8.3	2.2	12.2			3.3	7.4	9.0	18.6	4.6	7.4	0.0	14.8	4.0	6.8			2.7	8.2	3.5	7.7
1985	4.5	2.2	5.3	3.9	7.5	7.9	5.7	-0.1			5.9	2.8	10.3	6.4	4.7	7.3	3.7	6.4	5.5	5.1			5.5	5.4	6.0	5.5
1986	4.8	5.0	5.0	0.1	6.5	-0.4	6.5	16.9			3.8	-0.3	7.8	3.8	6.4	5.0	1.2	2.7	4.5	0.8			1.2	3.7	4.8	1.9
1987	4.2	4.8	3.1	3.0	3.0	0.9	5.0	1.9	2.5	7.0	4.0	2.5	5.0	13.6	4.0	3.2	3.2	2.0	4.5	3.9	4.0	10.0	3.5	5.2	3.7	3.5
1988	3.5	9.2	2.0	6.0	2.0	6.2	3.5	6.1	4.0	8.0	4.0	7.9	6.1	8.9	3.8	5.9	1.9	9.0	3.5	8.2	6.5	7.8	2.9	1.4	3.3	6.2
1989	6.1	7.0	4.1	6.5	5.0	9.7	3.5	3.8	5.8	8.8	7.1	8.8	7.8	10.5	6.5	9.1	4.6	7.7	4.6	5.2	6.5	21.2	3.9	4.9	5.5	8.0
1990	6.1	5.8	5.3	6.9	7.2	7.0	4.0	-6.9	5.4	8.3	7.0	5.4	9.3	5.8	5.0	4.2	5.5	1.5	5.9	5.2	11.0	12.0	8.2	6.6	6.7	6.0
1991	4.8	2.4	4.2	5.9	9.2	11.7	4.5	14.6	5.1	11.2	4.4	4.6	6.1	5.0	3.9	0.9	3.3	2.9	4.6	5.1	8.4	-0.2	1.6	1.7	5.3	5.7
1992	4.8	0.2	7.0	5.5	6.1	5.3	4.1	7.2	7.4	6.1	5.1	5.0	6.0	14.4	4.0	4.3	3.3	0.2	4.9	2.2	3.9	5.5	5.8	2.2	5.4	4.2
1993	0.9	2.0	2.1	0.8	1.5	-9.5	5.0	0.0	6.2	11.5	2.4	-1.0	3.2	10.3	6.1	8.4	0.9	-5.0	2.4	0.9	2.9	-6.6	7.9	3.2	3.7	-0.2
1994	1.7	7.8	2.6	8.2	2.9	9.2	5.1	3.0	7.5	20.7	3.5	6.5	4.5	14.9	5.6	10.9	1.1	7.1	3.1	6.8	4.2	14.9	3.4	9.9	3.7	9.6
1995	6.5	10.0	5.5	0.7	8.1	6.3	5.0	3.5	12.2	9.6	6.6	7.5	8.2	18.2	7.4	10.9	5.0	3.8	5.6	8.2	12.9	12.5	7.0	7.3	7.5	8.2
1996	5.5	3.3	5.2	1.5	5.3	4.5	5.5	-0.7	6.3	12.0	5.5	5.0	8.5	10.0	8.8	-0.3	4.4	-0.8	6.4	4.6	12.8	11.5	7.0	6.7	6.6	4.8
1997	5.5	6.1	4.5	5.7	6.0	11.5	4.3	5.1	8.2	16.1	5.2	12.3	8.7	17.5	5.3	5.1	3.7	5.7	5.9	6.5	7.2	9.8	6.6	8.2	6.0	9.9
1998	7.3	3.3	6.9	1.3	9.6	7.5	5.4	1.7	9.8	5.1	7.6	6.7	11.5	21.4	6.9	1.7	3.6	14.1	7.8	6.5	9.4	7.9	3.4	1.0	7.7	5.5
1999	4.6	5.0	3.2	6.8	3.8	5.3	3.7	2.3	6.6	5.0	3.5	3.7	12.1	11.7	4.6	-1.0	4.8	-2.0	4.8	5.6	6.9	0.0	3.9	3.1	4.7	4.2
2000	5.5	9.1	4.8	10.5	7.1	13.5	5.1	11.8	9.0	9.2	5.6	13.1	9.8	17.6	4.9	9.7	5.0	14.8	5.9	10.0	6.8	0.0	7.6	11.3	6.6	11.8
2001	8.2	-0.4	7.0	1.1	9.9	5.3	7.2	1.3	10.0	2.0	8.7	0.1	12.0	6.2	9.2	0.2	9.0	4.5	8.3	1.0	8.0	3.4	7.5	2.1	9.0	2.0

1970-1973(F,R): occasionally goods and services when goods only were not available

1989-1997(R): The outturn data for import prices are latest available data.

From 90-XI onwards, first settled estimates were dropped as t+2 forecasts were added in the published tables.

1970-1977(F,R) EU: CAL

1995(F) EU: in fact EUR16

1972(R) EU: 1.2 for EUR9

1973(R) EU: 13.6 for EUR9

1980(R) EU: 13.4 for EUR10

1981(R) EU: 13.7 EUR10

1985(R) EU: 2.3 for EUR12

1986(R) EU: -14.5 for EUR12

1994(R) EU: idem for EUR15

Annex C: Exchange rate arrangements among Member States (1979-2001) and Candidate Countries (2002)

Table C1: From ERM to euro: The evolution of the fixed exchange rate arrangement among EU Member States, 1979- 2001

	BEF	DKK	DEM	GRD	ESP	FRF	IEP	ITL	LUF	NLG	PTE	GBP
1979												
13 March	entry ±2.25%	entry ±2.25%	entry ±2.25%			entry ±2.25%	entry ±2.25%	entry ±6.0%	entry ±2.25%	entry ±2.25%		
11 November	0	-3.0	+2.0			0	0	0	0	0		
1981												
23 March	0	0	0			0	0	-6.0	0	0		
5 October	0	0	+5.5			-3.0	0	-3.0	0	+5.5		
1982												
22 February	-8.5	-3	0			0	0	0	-8.5	0		
14 June	0	0	+4.25			-5.75	0	-.275	0	+4.25		
1983												
21 March	+1.5	+2.5	+5.5			-2.5	-3.5	-2.5	+1.5	+3.5		
1985												
22 July	+2.0	+2.0	+2.0			+2.0	+2.0	-6.0	+2.0	+2.0		
1986												
7 April	+1.0	+4.0	+3.0			-3.0	0	0	+1.0	+3.0		
4 August	0	0	0			0	-8.0	0	0	0		
1987												
12 January	+2.0	0	+3.0			0	0	0	+2.0	+3.0		
1989												
19 June					entry ±6.0%							
1990												
8 January								margin ±2.25%				
	0	0	0		0	0	0	-3.6774	0	0		
8 October												entry ±6.0%
1992												
6 April											entry ±6.0%	
14 September	+3.5	+3.5	+3.5		+3.5	+3.5	+3.5	-3.5	3.5	+3.5	+3.5	+3.5
17 September	0	0	0		-5.0	0	0	exit	0	0	0	exit
23 November	0	0	0		-6.0	0	0		0	0	-6.0	
1993												
1 February	0	0	0		0	0	-10.0		0	0	0	
15 May	0	0	0		-8.00	0	0		0	0	-6.5	
2 August	margin ±15.0%	margin ±15.0%	margin ±15.0%		margin ±15.0%	margin ±15.0%	margin ±15.0%		margin ±15.0%	margin ±15.0%	margin ±15.0%	
1995												
6 March	0	0	0		-7.0	0	0		0	0	-3.5	
1996												
25 November								entry ±15.0%				
1998												
15 March				entry ±15.0%			+3.0					
1999												
1 January	euro	margin ±2.25%	euro	margin ±15%	euro	euro	euro	euro	euro	euro	euro	
2001												
1 January				euro								

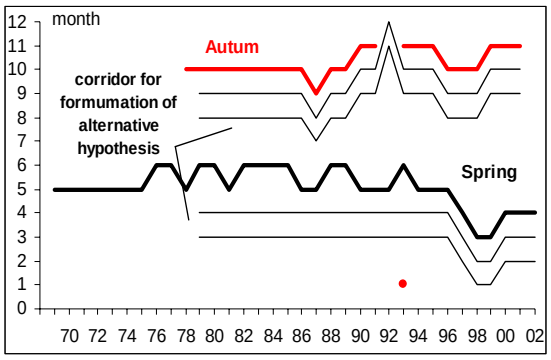
Table C2: Exchange rate regimes among Candidate Countries, August 2002

Country	BG	CY	CZ	EE	HU	MT	LV	LT	PL	RO	SK	SI
Currency	lev	pound	koruna	kroon	forint	lira	lats	litas	zloty	leu	koruna	tolar
Reference currency	euro	euro	euro	euro	euro	euro, USD, GDP	SDR	euro				euro
Regime	currency board	margin ±2.25%	managed float	currency board	margin ±15.0%	fixed peg	quasi-currency board margin ±1.0%	currency board	float	managed float	managed float	managed float

Annex D: Detailed information on the formulation of alternative assumptions: forward exchange rates, central parity and oil futures

Timing for the formulation of the alternative assumptions

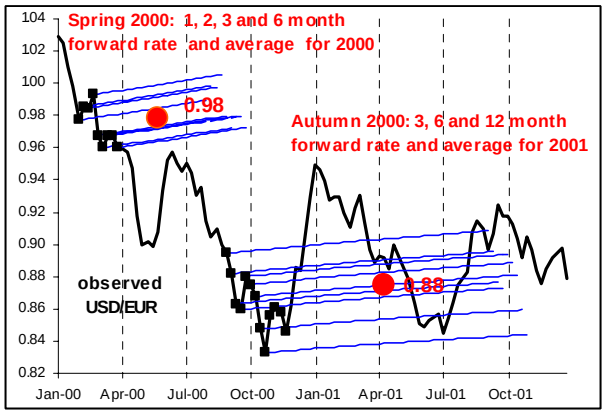
Figure D1: Timing for the formulation of alternative assumptions



As forward rates or oil futures could be rather volatile and in order to avoid to give too much weight to a particular date, averages have been calculated over 2 calendar months. Due to data availability and for computational facility, this period ended the month (or the month therefore) before the finalisation month of the forecasts (see figure B1). Hence, the average number of days between the calculation of the alternative hypothesis and the finalisation of the forecasts is somewhat less than 1 month reflecting the time needed to process the information. The central parity as an alternative exchange rate hypothesis was the last one prevailing in the 2 month period over which also the above mentioned averages were calculated.

Forward exchange rates

Figure D2: Forward exchange rates as an alternative assumption in 2000



The forward rates on a weekly basis were retrieved from the WEFA databank. When there existed a dual exchange market in Belgium until the beginning of 1990, the convertible forward exchange rate has been used. For the current year forecast, the 1, 2, 3 and 6 month forward rates, as observed during the reference 2-month period before the finalisation of the Spring Forecasts, have been used to calculate the alternative exchange rate hypothesis, taking also into account the observed exchange rate evolution. The year ahead forecast, made in Autumn of the year before, is based the 3, 6 and 12 month forward rates. Figure B2 illustrates the approach followed for the USD/EUR exchange rate with the Spring and Autumn Forecasts of 2000.

The expected appreciation or depreciation is calculated, in the case of the current year forecast, on the basis of the observed average exchange rate in the previous year. In the case of the year ahead forecast, made in Autumn when the outcome for the current year is not yet known, the calculation is based on the exchange rate assumption for that year as published in the Commission Autumn Forecasts. The calculated forward rates are presented in table B1.

In the WEFA databank there were no forward rates available for Greece, Ireland and Portugal, while Spanish data have been available only since 1986. With the introduction of the euro on 1 January 1999, the forward market for the participating currencies disappeared and was replaced by a single forward market. In the case of the year ahead forecast, there is still an entry for the year 1999 as it this forward rate was formed in Autumn 1998.

Table D1: Forward exchange rates as an alternative hypothesis (annual % change against DEM or EUR after 1999)

	BEF		DKK		USD		GRD		ESP		FRF		IEP		ITL		LUF		NLG		PTE		GBP	
	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya
1979	1.7		2.3		-7.4						3.2				7.6		1.7		0.8				-21.5	
1980	1.8	3.3	10.1	7.5	0.6	-4.7					0.7	4.1			3.5	5.0	1.8	3.3	0.4	1.9			4.7	-2.1
1981	2.8	3.0	1.2	5.5	16.6	-2.6					1.8	2.8			7.4	10.7	2.8	3.0	0.8	1.4			5.9	-0.9
1982	16.3	4.0	9.5	4.7	4.2	1.6					11.6	6.1			11.3	9.9	16.3	4.0	-0.1	0.5			-7.4	-6.2
1983	7.2	4.8	5.5	5.1	-1.1	1.2					12.8	10.9			7.0	5.4	7.2	4.8	1.8	-0.4			-15.4	0.0
1984	3.7	3.1	2.8	2.6	2.0	1.6					5.1	7.3			7.8	7.7	3.7	3.1	1.1	0.1			-2.5	1.6
1985	-0.2	2.0	1.0	1.9	11.7	1.2					0.4	3.6			2.3	5.6	-0.2	2.0	0.4	0.4			-3.8	-1.0
1986	2.1	3.6	3.5	4.2	-22.8	-8.2			10.5		3.6	3.9			8.0	11.1	2.1	3.6	0.2	0.3			-12.4	-2.7
1987	1.3	2.3	2.8	4.7	-16.4	-6.6			11.0	5.8	5.1	4.2			0.5	2.6	1.3	2.3	0.3	2.3			-9.4	-8.4
1988	1.2	1.7	2.1	3.8	-7.5	-0.6			-1.7	4.4	2.6	2.6			4.3	7.8	1.2	1.7	-0.3	0.6			3.8	-1.6
1989	0.4	1.4	1.5	8.3	5.9	3.5			-5.2	2.8	0.2	2.2			3.8	5.0	0.4	1.4	0.3	0.5			1.5	-1.4
1990	-0.8	0.5	-0.8	1.1	-9.9	0.8			2.2	3.6	-0.4	0.8			1.2	2.5	-0.8	0.5	-0.2	0.1			-10.8	-4.9
1991	-0.4	-0.5	-2.8	1.1	3.6	-5.3			-1.0	2.8	0.6	0.0			-0.9	0.5	-0.4	-0.5	0.0	-0.3			4.8	-0.6
1992	-0.2	0.0	0.6	1.0	1.0	3.4			1.1	2.1	-0.3	0.3			0.0	-2.3	-0.2	0.0	-0.1	0.0			-1.9	-1.4
1993	0.0	-0.3	1.3	0.7	4.4	4.2			11.4	13.0	0.2	1.3			23.6	12.7	0.0	-0.3	-0.3	-0.3			-12.2	-9.8
1994	-1.3	4.7	0.8	5.1	2.5	0.5			6.9	7.0	-0.1	2.5			3.6	6.6	-1.3	4.7	0.0	-0.1			1.1	-0.1
1995	-0.8	0.2	3.4	2.1	-14.6	-6.0			10.9	2.7	3.9	0.5			21.0	9.2	-0.8	0.2	-0.1	-0.1			-10.8	-3.5
1996	-0.1	0.1	-2.0	1.0	3.8	-1.4			-2.7	2.3	-2.0	1.0			-1.4	3.5	-0.1	0.1	-0.1	-0.1			0.2	-2.9
1997	0.3	0.2	-1.4	0.1	11.7	-1.7			1.0	2.7	-0.8	0.6			-3.3	-2.8	0.3	0.2	0.3	0.0			15.5	-1.0
1998	0.1	0.1	-0.3	0.8	4.4	2.2			0.5	0.9	-0.5	-0.2			-6.2	-2.9	0.1	0.1	0.1	0.1			4.3	0.4
1999		0.0	-1.4	1.7	2.2	-2.3										-1.6		0.0		0.0			3.0	-4.0
2000			-0.3	0.3	-8.5	0.4																	-7.0	-0.9
2001			-0.2	-0.4	6.1	-5.9																	0.7	-1.3

cy: current year forecast (made in Spring of the current year) + : appreciation of DEM or EUR

ya: year ahead forecast (made in Autumn of the previous year)

Table D2: Central exchange rates as an alternative hypothesis (annual % change against DEM or EUR after 1999)

	BEF		DKK		USD		GRD		ESP		FRF		IEP		ITL		LUF		NLG		PTE		GBP	
	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya	cy	ya
1979	0.3		2.8								2.8		-1.6		8.3		0.3		0.6					
1980	0.1	0.6	8.2	4.4							1.3	1.8	-0.7	-1.8	2.7	3.8	0.1	0.6	0.8	1.2				
1981	-0.2	0.6	0.5	0.8							1.5	2.1	0.0	-1.2	5.5	-0.9	-0.2	0.6	1.1	2.0				
1982	12.6	-2.1	7.4	-1.0							7.2	-1.3	-3.7	3.2	7.3	-0.5	12.6	-2.1	-0.1	-0.3				
1983	6.5	1.8	5.8	2.0							13.3	5.1	-10.3	-1.5	12.4	4.1	6.5	1.8	2.4	0.1				
1984	0.1	0.3	1.4	1.2							2.9	2.9	-2.7	-2.8	5.3	5.1	0.1	0.3	0.8	0.7				
1985	-1.4	-1.6	-0.2	-0.2							-0.1	0.0	0.1	0.6	1.4	1.6	-1.4	-1.6	-0.1	0.0				
1986	1.3	-0.4	2.8	0.9							6.7	0.5	-3.6	-1.1	7.7	4.0	1.3	-0.4	-0.1	-0.2				
1987	0.2	-0.7	2.3	-0.7							5.0	2.1	-7.7	-5.4	4.9	2.0	0.2	-0.7	-0.1	-0.1				
1988	-0.7	-0.6	0.3	0.3							0.3	0.5	0.2	0.3	-0.1	0.1	-0.7	-0.6	0.0	0.0				
1989	-1.4	-1.5	-0.4	5.9							-1.1	-0.8	0.2	0.0	-2.8	-2.7	-1.4	-1.5	0.1	0.1				
1990	-1.6	-1.6	-1.9	-1.9					2.7	3.8	-1.1	-0.9	0.5	0.3	2.5	-0.6	-1.6	-1.6	-0.1	0.0				
1991	-0.2	-0.5	-0.4	-0.6					3.1	3.3	-0.5	-0.7	0.3	0.5	0.9	1.0	-0.2	-0.5	0.0	-0.3			2.7	2.5
1992	0.1	0.2	-1.1	-0.9					3.7	3.8	-1.4	-1.3	0.3	0.3	0.1	0.3	0.1	0.2	-0.1	0.0			0.8	0.5
1993	0.2	0.2	-1.3	-1.3					11.1	11.1	-1.1	-1.0	-9.2	0.9			0.2	0.2	0.0	0.0	7.0	7.0		
1994	-1.3	-1.0	-2.7	-2.9					3.1	3.3	-2.1	-2.1	-0.5	-0.3			-1.3	-1.0	0.3	0.2	1.9	2.4		
1995	0.1	0.1	-2.7	-2.8					3.1	-3.9	-2.0	-1.9	-0.6	-0.4			0.1	0.1	0.5	0.4	0.2	-3.3		
1996	0.3	0.2	-2.4	-2.5					-2.2	-2.2	-3.7	-3.6	4.9	4.5			0.3	0.2	0.6	0.5	-2.1	-1.9		
1997	0.2	0.3	-1.1	-1.1					1.1	1.1	-1.4	-1.4	0.2	1.0	-3.5		0.2	0.3	0.5	0.6	0.0	-0.2		
1998	0.0	-0.1	0.1	0.1			14.3	0.0	0.8	0.7	-0.4	-0.5	-5.5	-9.0	0.8	0.8	0.0	-0.1	0.1	0.1	1.5	1.6		
1999		0.0	-0.5	0.1			6.8	6.7		0.2		0.0		-0.8		0.3		0.0		0.0		1.0		
2000			0.3	0.3			8.4	8.6																
2001			0.1	0.1																				

cy: current year forecast (made in Spring of the current year) + : appreciation of DEM or EUR

ya: year ahead forecast (made in Autumn of the previous year)

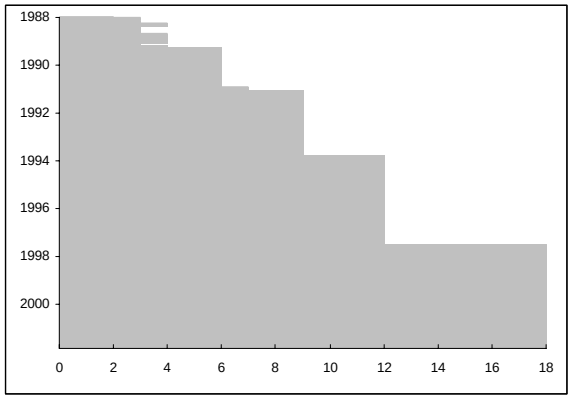
Central parities

Based on the information in table A1 of annex A, the expected appreciation or depreciation based on the central parities on the moment that the exchange rate hypotheses are formulated, are presented in table B2.

The expected appreciation or depreciation is calculated in the same way as the in the case of the forward rates: based on the outcome of the previous year for current year assumptions and based on the Autumn assumption for the year ahead hypothesis.

Oil futures

Figure D3: Evolution of the number of oil futures contracts, 1988 - 2001



A series for future prices for crude brent, the oil price monitored in the Commission Forecasts, has been available since mid 1988 on the International Petroleum Exchange Website. The number of contracts offered has evolved over time. In the beginning of 1988 two contracts were regularly traded and at the end of that year up to four. The expiry date is shifted by one month and falls around the middle of the month. It means that the maximum forecast horizon is four months. This gradually increased to one year in April 1994 (see figure B3), when 12 contracts were offered. In January 1998 the number of contracts regularly traded increased to 18, by adding 4 contracts with a quarterly interval for the expiry date and 2 contracts with a half-yearly interval. This brings the maximum forecast horizon to 3 years.

Unlike forward exchange rate contracts where the maturity is fixed, oil futures have a fixed expiry date (implying that the maturity shortens when the expiry date approaches). The daily oil futures prices of the relevant contracts observed in the last month of the above mentioned 2-month period for the formulation of the external assumptions, is used (see table B3). The development of the oil futures market implies that the calculation of the alternative oil price assumption is not the same over the sample. The year ahead forecast for 1989, made in Autumn 1988, is based on future prices observed in the last few days of September 1988, for delivery in January 1999. The price information in the other 3 oil futures contracts with expiry dates in October, November and December 1998 cannot be used as the year for which the assumption has to be formulated is 1999. When more contracts are available, the sample for the calculation of the assumed average oil price is larger. For example, in 1994 when the number of contracts increased to 12, the assumption for the current year, formulated in Spring, is based on 8 contracts expiring from May to December. Of the 18 contracts available in Autumn 1998, the information contained in 10 was usable to formulate the alternative hypothesis for the year ahead (1999): 9 contracts with expiry dates from January to September and the contract with expiry date in December.

Table D3: Oil futures prices as an alternative hypothesis

	USD per barrel	
	cy	**ya**
1989	18.0	13.3
1990	17.8	17.8
1991	18.8	30.3
1992	18.7	20.9
1993	19.0	18.3
1994	15.0	17.5
1995	17.6	16.4
1996	18.0	15.6
1997	19.3	19.1
1998	15.8	18.6
1999	11.3	14.7
2000	24.9	19.9
2001	25.4	28.7

cy: current year forecast
ya: year ahead forecast